OVERSIGHT OF THE NATIONAL CLIMATE PROGRAM

HEARINGS

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

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SCIENCE AND TECHNOLOGY
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OVERSIGHT OF THE NATIONAL CLIMATE PROGRAM

THURSDAY, MARCH 5, 1981

House of Representatives, Committee on Science and Technology, Subcommittee on Natural Resources, Agriculture Research, and Environment,
Washington, D.C.

The subcommittee met, pursuant to notice, at 8 a.m., in room 2325, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Mr. Scheuer. The first hearing in the 97th Congress of the Subcommittee on Natural Resources, Agriculture Research and Environment will come to order.

We should have a very enriching and instructive hearing this morning, and I an glad to welcome you all, and I will be glad to welcome my distinguished colleague from New York, Mr. Carney, who will have a statement after my brief statement.

We are very happy to have with us our distinguished colleague from California, Mr. George Brown, who is the author of this legislation of which we are having an oversight hearing this morning.

I importuned that Congressman Brown chair this oversight hearing on his bill, about which he knows a very great deal, and about which he cares a very great deal. For reasons good and sufficient to him he deferred, but I hope he will consider himself, as we consider him, the godfather of this bill, the intellectual father confessor of us all on this bill, and I hope, Congressman, you will intervene at any time, with the permission of the witnesses, of course.

We have five experts with us this morning. Dr. Edward Epstein, who is director of the national climate program will testify, and he is accompanied by Mr. Martin Belsky, the Assistant Administrator for Policy and Planning of NOAA, who may also have some remarks, at his discretion.

We will then hear from Dr. Werner Baum, chairman of the National Climate Program Advisory Committee, and Prof. Verner Suomi, chairman of the Climate Board of the National Academy of Sciences, and finally, Stanley Changnon, Jr., president of the American Association of State Climatologists.

I am delighted that my colleague from New York is joining us, and I am delighted that my senior colleague from California is with us. We should be considering a very interesting and exciting and stimulating legislative program in the months ahead. I look forward to working with Congressman Carney, and all of the other members of the subcommittee.

I want to assure all of my colleagues, both minority and majority, that we will continue in the bipartisan tradition in which the Science and Technology Committee is generally run, and which has distinguished the operations for this subcommittee also.

Today's hearings are aimed at gathering information useful to the subcommittee in consideration of the oversight of the National Climate Program Act, which became law on September 17, 1978, a law that was sponsored by Congressman Brown, a very distinguished member of this committee.

The national climate program encompasses a wide variety of research and service programs in a dozen different Federal agencies which are listed in the many publications concerning the national climate program; Department of Agriculture, Commerce, Defense, Energy, Health and Human Services, Housing and Urban, Interior, Justice, State, Transportation, Treasury, AID, CEQ, Environmental Protection Agency, Federal Emergency Management Agency, NASA, and the National Science Foundation.

It is an enormous group of independent people, for which we are very hopeful the national climate program will create an integrated, holistic attack on the problem potential of climate.

The program, of course, was designed to foster greater use of climate information and forecasts by Federal, State, and local governments and, most especially, by private users concerned with food, energy, water, and other resources.

In addition, the program addresses a number of international and global concerns, including the roles of fossil fuel combustion and global deforestation in increasing carbon dioxide levels in the atmosphere.

Global warming due to the carbon dioxide "greenhouse effect" is potentially the most serious long-range environmental hazard facing our would.

The oversight of the national climate program is essential, both because of the innovative nature of the enabling legislation and, also frankly, because of the somewhat half-hearted and reluctant implementation of the law over the last 2½ years by the executive branch.

Congress had two principal concerns in mind when it created the climate program. First, that a coordinating body, the National Climate Program Office, be given the authority to oversee a comprehensive, well-planned national effort, and, second, that new approaches be developed to convey climate information to users.

Both of these areas, I regret to say, since there is a consensus up here, that implementation of the act has fallen considerably short of congressional hopes and expectations.

The National Office's first 5-year plan was 14 months overdue, and that office continues to lack the authority to truly direct a national effort in climate. The centerpiece of the effort to convey climate information to users, the intergovernmental program, has been delayed and underfunded. We would like to know why.

Today, we will hear about the activities of the National Office from its director, Dr. Epstein, and any further remarks the Assistant Administrator for Policy and Planning of NOAA might care to make.

Then we will hear suggestions, as I have said before, from Dr. Werner Baum, Dr. Verner Suomi and Mr. Stanley Changnon.

We look forward to your counsel, and we know it will be very helpful to us. We note in passing, before we begin these hearings, that we have not yet received the fiscal year 1982 budget of the Reagan administration, so we don't have the fine tuning, but we will have it, I suppose, by March 10 when the specific recommendations do come up.

In any event, while a specific review of future administration plans for the climate program is not possible at this time, today's record will be crucial to our later review of these proposals when they come over here in the next week or so.

Because of constraints of today's hearings it will be necessary for us to request that witnesses limit their remarks to no more than 8 or 10 minutes. Of course, the full text of your prepared remarks will be included in the record as you commence speaking.

I thank you very much for being here today, and am very much looking forward to your testimony.

At this time I would like to call on my very distinguished colleague, and the author of this act, Congresman George Brown.

Mr. BROWN. Thank you. Mr. Chairman. Let me just say briefly that I think all of the gentlemen before us today are at least as interested in the success of this program as the members of this subcommitee, and we are looking forward to any suggestions or recommendations that they may have as to what we can do to enhance that success.

Despite the laudatory words of the chairman, the actual development of this act came from the profession itself, from those in the Government interested in a more effective and comprehensive climate program, and we merely assisted in trying to give that a legislative trademark. I am looking forward very much to the testimony.

Mr. SCHEUER. Thank you, Mr. Brown, your modest remarks are very well taken. However, the classic role of the political animal, as I see it, is to provide the leadership and insight to zero in on the talent and creativity in the professions and tap their brains and produce a legislative product. That to me is a high art form, and Congressman Brown has performed it with great distinction.

I now call on my colleague, Congressman Carney of New York, who is the ranking minority member of this subcommittee, and to whom I look forward with great pleasure to working with.

Mr. CARNEY. Thank you, Mr.Chairman. With this first meeting of the subcommittee in the 97th Congress I would like to take the opportunity to congratulate you on your election to the chairmanship of the subcommittee.

I'm sure the next 2 years will see exciting times for the committee. There are a great deal of challenges that will be faced in the Congress, and as we move forward with broad budget cuts throughout Government we bear a heavy responsibility to insure that there will be adequate resources to do the basic scientific research necessary to safeguard the environment.

There are many Members of Congress who believe that far too frequently in the past there has been a rush to regulate, and unfortunately, that charge has often proved to be true. Many regulations have been overturned in court because there had been either little or no scientifically defensible research conducted to establish a data base on which to defend the regulations.

Our job in the environmental area will be to provide adequate resources to conduct that research, and then to carry out our constitutional duties of congressional oversight to improve the quality of the research which we authorize.

Mr. Chairman, the Republicans on this subcommittee are committed to continue in the long-standing tradition of the Committee on Science and Technology of bipartisan cooperation and consultation on all matters that come before us.

Some of our newer members may not be aware of the historical background on the Science and Technology Committee of that bipartisan relationship, but they have agreed that bipartisan cooperation is the most effective way to conduct this type of activity when we are dealing in the realm of scientific research.

We will continue that position of friendly cooperation and consultation in all areas of subcommittee business, and we trust, as you have already said, that it will be reciprocal.

Now, Mr. Chairman, I would like to join you in welcoming our distinguished witnesses here today. As you have already pointed out, we will not see the revised budget request until President Reagan's submission next week, on the 10th of March. The future of this program, like many others, may well depend upon the reductions proposed by the President. Today we begin one of the most difficult jobs ever to face elected officials. We must review a number of programs, many of which are highly meritorious and all of which have avid supporters.

There are limited tax dollars to support programs, and the taxpayers are calling for a reduction in Federal spending. Today we start the process. Determining where the cuts must be taken will be a long and arduous process, but working together I know we can accomplish that task, and with the other members on this side, I look forward to doing just that. Thank you, Mr. Chairman.

Mr. SCHEUER. Thank you, Congressman Carney. It is a very special pleasure for me now to welcome, not only to the Congress but to the subcommittee, a new member, Congresswoman Claudine Schneider of Rhode Island. We are delighted to have you, and are going to enjoy working with you very much. Do you have any remarks?

Mrs. SCHNEIDER. No, thank you, Mr. Chairman.

Mr. SCHEUER. All right. I would like to welcome also Congressman Jim Sensenbrenner of Wisconsin. Congressman, do you have any remarks you would like to make?

Mr. SENSENBRENNER. None whatsoever, Mr. Chairman, thank you.

Mr. SCHEUER. All right. Thank you all very much for attending today. I'm afraid the minority is better represented here than the majority.

Mr. CARNEY. There is nothing to fear, Mr. Chairman.

Mr. SCHEUER. Thank you very much.

Now we will hear the opening witness, Dr. Edward Epstein, director of the National Climate Program Office.

Mr. Belsky, if at any time you wish to add anything or interject any remarks, we will be happy to have you address us, either after Dr. Epstein is finished with his testimony, or you might wish to interject while he is testifying.

Mr. **Belsky**. With the Chair's permission, I will be testifying and Dr. Epstein will be testifying with me and answering questions.

Mr. **Scheuer**. No, I am asking Dr. Epstein to testify. You will be more than welcome to make any remarks you wish after Dr. Epstein is finished, or if you wish to interject while he is testifying, we will be happy to have that. But the schedule calls for Dr. Epstein to testify, and we are inviting Dr. Epstein to testify.

Now, Dr. Epstein, you do have prepared remarks yourself?

Dr. **Epstein**. I do not have prepared remarks.

Mr. **Scheuer**. All right. Why don't you go ahead and chat with us informally for 8 or 10 minutes, and we will probably have some questions for you. Then we will be very happy to hear from Dr. Belsky.

STATEMENT OF DR. EDWARD S. EPSTEIN, NATIONAL CLIMATE PROGRAM OFFICE, ACCOMPANIED BY MARTIN BELSKY, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Dr. **Epstein**. Thank you, Mr. Chairman.

The national climate program is something in excess of 2 years old now. We spent a good part of the first year of our effort trying to produce a useful, workable, effective plan for national climate program.

It took a very long time to produce that plan for a number of reasons. A lot of it was because of the need to consult with various people who would provide input to it, but a large part was due to the problems of just getting everyone to agree that we had the right approach in our plan.

I think that the plan that was produced has been an effective plan, that we are quite pleased with this. As we proceed with the implementation of that plan I think we are finding that there are perhaps some faults with it, but those are correctable as we go, and we will in the future.

We are now in the stage of trying to implement the program. Even though the plan itself was not formally promulgated until November 1980 there was substantial agreement on the plan very early in the 1980's. In fact, the activities of the various agencies in the Federal Governmant involved the national climate program were in conformity with the plan during fiscal year 1980.

There have been both successes, and areas where there has been less than adequate success, as far as I can see, in the program. If you follow through the various substantial areas in the program, in each of those the ones that have been identified in the plan as areas of highest priority you can find examples of rather important scientific, technical successes.

I cannot say, however, that all those successes were the doing of the national climate program or the National Climate Program Act. In many cases these successes would have occurred just because of the inertia of the agencies and of the program in carrying out there activities.

There have been some singular activities which were stimulated by the National Climate Program Office and by the act. There have also been areas highlighted in the act, and which we have been trying to implement, in which we have not been nearly as successful as we would have liked.

The prepared testimony that Mr. Belsky has to offer identifies clearly some of the successes. I do not want to minimize that statement; there have been substantial successes, but in the couple of minutes I have I will point out what I consider some of the more difficult areas, the ones where we have not moved as fast as I would have liked.

One of these is in the area of the information services, the areas related to the intergovernmental climate program. We have started activity, although its scope is still small, to provide some demonstration projects, as a preliminary step toward implementing an intergovernmental climate program.

However, the administration has not been favorably inclined to pursue this kind of program.

Mr. SCHEUER. When you say the administration——

Dr. EPSTEIN. The administration I'm talking about is the previous administration, since I have not had any specific guidance from the present administration.

Mr. SCHEUER. I thought that was what you meant.

Dr. EPSTEIN. However, I think I should make the point that one of the reasons for this lack of support is that the legislation defines this as a categorical grant program, and as I remember the President's speech to the Nation only a couple of weeks ago, he too indicated lack of support for categorical grant programs. I think that will be a continuing problem in implementing this particular approach to providing climate services.

One of the things I think we have to do is to look very carefully at ways of accomplishing the goal, which is to make climate information more useful, see that it is used more effectively in all kinds of pursuits, and to seek an innovative way of approaching these goals while avoiding the pitfalls of the specific approach defined in the legislation.

Another area in which we have been perhaps less successful than I would have liked, has been the effectiveness of the National Climate Program Office in filling the gaps between the agencies. Particular programmatic activities occasionally arise that seem very important for the national climate program as a whole, but are not a very high priority in any of the individual agencies.

Mr. SCHEUER. Will you give us an example of those kinds of programs that fell between the gaps?

Dr. EPSTEIN. One particular example relates to certain aspects of ocean climate monitoring, involving both obstructions in various critical areas subsurface temperatures and the long-term sea level.

Research programs have demonstrated very clearly the importance of such data, but the research agencies quite properly, do not want to maintain such programs on a routine basis. The agencies that are involved with monitoring, however, have other priorities, and therefore, were unable to put that particular kind of climate monitoring at the top of their list.

When the Climate Program Office tries to identifies these activities, either to the agencies or to the administration, we have not been successful in inducing changes that would encourage activities which seem to be important from the climate program perspective, as opposed to the individual agencies' perspectives.

This completes my remarks at this time. Perhaps Mr. Belsky could make sone additional comments.

Mr. **Belsky**. I have no further comments.

Mr. **Scheuer**. You are more than welcome to add anything you would like, Mr. Belsky.

Mr. **Belsky**. The only thing I would like to add is one of the areas I think that you noted in your opening statement, and that Mr. Carney mentioned, was that we are going through a process right now of looking at numerous budget items, and I hoped that by today we would be able to bring them to the committee for your consideration a copy of the legislation that would include the budget figures that would be proposed for an authorization.

Such budget figures have not been released, and probably will not be released until after March 10, as Mr. Carney has indicated. At that time we will be availavle to come back to talk about those. There are a few technical kinds of amendments that might be useful for you to follow, and I think would support the climate program.

One, for example, and I think Mr. Brown was going to talk about it as well, is a mandate to have an update and revision every 2 years. We might want to talk about that.

The second is the deadline for actually coming out with an annual report. One of the functions of Dr. Epstein's office, and a very valuable function is to go to the Office of Management and Budget and Congress with an evaluation of all the budgets for the various Federal agencies, and to indicate how they manage, and establish their priorities. The only way he can do this is to see what the budgets are.

The way the timing is set out in the statute it is very difficult for Dr. Epstein's office to look at the budgets, make an analysis, and come back and give a critique.

Mr. **Scheuer**. When will he have all of that data for fiscal 1982?

Mr. **Belsky**. We have the data for fiscal year 1982 from the Carter budget. We don't have the data, obviously, for fiscal year 1982 for the Reagan administration.

Mr. **Scheuer**. That is what I mean. When will he have the data on that?

Mr. **Belsky**. On March 10 we hope to start getting that information. We have already gotten some preliminary.

Mr. **Scheuer**. And how long do you think it will take you to evaluate the figures you are going to get on March 10, and come up with some kind of holistic plan that you can come back to us with?

Dr. **Epstein**. We have sufficient background information that I think that we can do a reasonable analysis in 2 weeks. It is the question of production and clearance. The annual report is one which we want all of the participating agencies to see and approve of before we submit it.

Mr. **Scheuer**. Well, if you are going to try and get clearance from—I don't know how many agencies I ticked off, some 15 or 18, barring some very sharp directive form the White House to come up with their clearance, or whatever reservations they may have in a 2- or 3-week period, it won't happen in your lifetime or mine.

Mr. **Belsky**. Mr. Chairman, there is one alternative we are considering, which is instead of coming up with a full annual report, to merely do a budget cross-cut up front, not to give an analysis until later.

That information is public, as of March 10, and the agencies cannot complain when we look at the various budgets. It is the analysis of those issues that is going to take the time to clear it, that is, the actual wording that we put in a document that has to go to various agencies. So what we might do is have a two-step process; one to get a summary looking at the budget, and that would be followed up with the actual annual report, with an analysis.

Mr. **Scheuer**. That's fair enough, and a little later, also, nopefully, we will have clearance from all the agencies, but you could bring it up to us and at the same time send it to them and we will have another period of 2 weeks to a month for them to come in with any reservations.

Mr. **Sensenbrenner**. Mr. Chairman, will you yield?

Mr. **Scheuer**. I yield, Mr. Sensenbrenner.

Mr. **Sensenbrenner**. Recognizing under the Budget Act that the full committee has got until May 15 to report the authorization legislation to the House, how soon before the May 15 date do you think that you could come up with the analysis, so at least we would have that knowledge when we make our decisions on that bill?

Mr. **Belsky**. Mr. Sensenbrenner, there are two different issues. I would like to start by sayng one is the authorization for this bill. We will have that by March 12. The bill is almost all the way through. The final cuts are being made by the Reagan administration throughout the various parts of the agencies, and this will be ready, I believe, almost right away. That will have the full text for this committee to consider for authorization for this legislation.

Under your oversight responsibilities there is a note in the statute that makes it very clear that you are to look at not only the budgets for which you auuthorize directly but all the budgets that you have impact on, and that cross-cut I think we are going to need a little more time on, because we are going to go to various agencies to see how the internal programs were affected by the budget change.

So I think we will have this authorization probably ready 2 days after March 10, but the oversight responsibility, looking at the other budgets, I think is going to take a little longer.

Mr. **Sensenbrenner**. Mr. Chairman, I yield back my time.

Mr. **Carney**. I was going to ask Mr. Belsky, from the standpoint of the budget that you received from the Carter administration, if this budget should be unchanged by the Reagan administration, would you be ready to proceed with your programs?

What I'm trying to say is, we are trying to look at what you think you need, and the only thing we have in hand right now is the Carter administration's budget, and I would like you to describe in a couple of words, how comfortable you would be if you were to get that entire budget. Is that enough to meet your requirement.

Mr. **Belsky**. The Carter administration budget provided additional funds for the first time for two of the programs you are going to hear about today, the experimental forecast centers and the intergovernmental program.

In addition, it provides some money for gaps, some of the things that Dr. Epstein has discussed. I think primarily because of the priorities set by this committee, and the legislation that was passed last year to give those priorities.

I can't say what the Reagan administration's budget is going to be at this present time, I am not able to say until March 10.

Mr. **Carney**. I understand that, but given the Carter administration's budget, would you have gone home happy?

Mr. **Belsky**. I will let Dr. Epstein answer that.

Dr. **Epstein**. For the most part, yes, although I can identify certain areas in which I think limitations remain. I have already referred to some of the specifics in my statement. These were things that I spoke about would not have been supported adequately from my perspective as I view the national climate program as a whole. Well, some of them would have had some extra funding in the Carter budget and some of them would not; I would have to reexamine it. But clearly, one of the problems is that the National Climate Program Office lacks the flexibility to adjust activities within that overall national climate program budget.

These are agency programs, and we can only look at the sum of those agency programs. We do not have any resources to fill in, or any authority to modify, those agency programs.

Mr. **Scheuer**. I thought I understood Mr. Belsky to say that there was provision for filling in the gaps. I'm a little confused.

Mr. **Belsky**. Obviously, the majority, 99.5 percent of the climate budget in the Federal Government is going to have to come from the individual agencies. We have made requests, and we have been given money, for example, in the past, through a discretionary fund in NOAA and in other ways to fill in some of the gaps.

But even if we filled in all the gaps, if the various agencies cut their budgets dramatically on March 10 we wouldn't be able to satisfy the needs for climate research, climate information, and other areas, and that is the concern, I think, Dr. Epstein was talking about. You have to rely on the agencies.

Mr. **Scheuer**. I take it that when you come to us after March 10, you will come to us with a suggested level of funding not only for your own National Climate Office but for all of these other agencies, all of these slices will add up to a pie of the order of magnitude sufficient to meet the challenge of the holistic integrated approach that it was the very mission of the national climate program to produce.

Dr. **Epstein**. I don't think, Mr. Chairman, that the pie itself is deficient in any way. I think it is more a question of how flexible we are, how much authority we have from the climate program's point of view to reslice that pie.

Mr. **Scheuer**. Well, it seems to me that goes to the very integrity of your mission. If you can't do that, what is the shooting match all about?

Mr. **Belsky**. If I could make one suggestion, there is a procedure, and I think Dr. Epstein is trying to do it very well, and succeeding in some areas, that in essence essentially provides for prioritizing by the national climate program.

Mr. **Scheuer**. That is a word that we don't allow here.

Mr. **Belsky**. Sorry.

Mr. **Scheuer**. Future generations of young Americans may be looking at these hearings. The only thing that separates us from the beasts of the jungle is the English language.

Mr. **Belsky**. The statute provides for the setting of priorities by the National Climate Program Office, and those priorities can be compared to what in fact has occured. As Dr. Epstein has indicated, a lot of the negotiations going on in the administration really isn't over the pie. It is whether the various agencies have been establishing and living up to the priorities that have been looked at by the National Climate Program Office. So I think that that is going to be the real key to see how the priorities come up after the budget cuts, not just show the total-dollar figures.

[The prepared statement of Mr. Belsky follows:]

Testimony of Martin H. Belsky
Assistant Administrator for Policy and Planning
National Oceanic and Atmospheric Administration

House Science and Technology Committee
Subcommmittee on Natural Resources, Agriculture Research
and Environment

March 5, 1981

Mr. Chairman and members of the Subcommittee, I am pleased to appear before you today to report on progress in implementing the National Climate Program Act, P.L. 95-367, and the National Climate Program. Although the National Climate Program Office is located in NOAA, the Program is a multiagency endeavor, and is an example of cooperation among government agencies at all levels. Scientists, managers, and executives have contributed to all aspects of the planning and implementation of the Program.

A particularly noteworthy achievement of the last year was the promulgation last fall of the first 5-Year Plan for the National Climate Program. As required by the Act, the Plan describes the full scope of national efforts needed to meet the challenges laid out in the legistlation, establishes a clear set of priorities for program implementation, and defines the roles of the involved Federal departments and agencies in pursuing the various activities. It also identifies the accomplishments that are anticipated and some of the options that exist for future Program implementation.

The basic strategy adopted for the Program is to emphasize expanding our understanding of climate while simultaneously developing useful products on the basis of present knowledge of climate. To implement this strategy three categories of priority activities have been established: Providing Climate Products, Responding to Impacts and Policy Implications of Climate, and Understanding Climate. I will say a little about the priority activities included in each of these categories, and report briefly on some of the highlights of recent accomplishments in these areas. I am attaching to my written testimony an outline of the Plan and the division of responsibility for its implementation.

Category I: Providing Climate Products

One activity under the category of Providing Climate Products is the Generation and Dissemination of Climate Information. NOAA is the lead agency for this effort, which is designed to make useful climate data and information more accessible. A tangible product of this activity is a recent publication of NOAA's Environmental Data and Information Service, entitled "A Quick Reference to Selected Climatic Data: The Interim Climate Data Inventory." This inventory contains information on 650 separate data sets to make it easier for users of climate information to know what data are available and how to obtain them. To encourage the international exhange of climate data this inventory has been made available to the World Meteorological Organization as a prototype for a computerized international interactive climate data inventory.

National Climatic Center's most frequently requested data sets into formats that greatly enhance their availablity to users. Basic marine climatological data and data from the approximately 12000 cooperative climatological stations throughout the United States are now available in less time and at lower cost.

Another aspect of the Generation and Dissemination of Climate Information is the effort to encourage demonstration Federal/State cooperative programs in climate. Five studies are now in progress (in California, Colorado, Connecticut, Michigan and Oklahoma) to explore various methods to improve the flow and utilization of climate information and to identify better the benefits and beneficiaries of climate services. These projects were selected after a review of more than 25 proposals from all parts of the country.

A second activity under the Providing Climate Products category is Climate Prediction. For this, too, NOAA is lead agency. The emphasis here is on improving relatively short-term climate projections (up to a year or two) where the opportunities for achieving useful, timely results appear to be greatest. The results of recently reported research lend support to these expectations. Studies supported by NSF, NOAA and others have provided both empirical and theoretical support to the notion that events in the central tropical Pacific may, under appropriate conditions, be effective indicators of Northern Hemisphere climate in subsequent months and seasons. Sea surface temperature variations in the tropical Pacific are not only reflected in local changes in cloudiness, but also, during the winter half of the year, can be used to predict anomalous surface air temperatures over North America.

Important results also have been forthcoming concerning the large scale, slowly evolving conditions (such as ocean temperatures and currents, sea level, cloudiness and precipitation, and air pressure) over the entire extent of the tropical Pacific and Indian Oceans that may prove highly significant in improving climate prediction. A great deal is being learned about the specific sequences of these events, and their seasonal characteristics. The "El Nino," the occasional appearance of relatively warm waters off the coast of Peru which has important implications for fisheries, is one manifestation of this very large scale coupled oceanic and atmospheric phenomenon.

The Climate Analysis Center of the National Weather Service, which is responsible for issuing operational monthly and seasonal outlooks, participates in these studies. In addition, the Center has initiated programs to provide a wider array of operational products describing the current state of the climate. Such information can assist both researchers and users who want to maintain a current awareness of the impacts of changing climatic conditions on agriculture, commerce, energy consumption, water resources, etc. To further this effort, the Center has scheduled a users' conference in May to help them refine their products and schedules.

One specific requirement of the National Climate Program Act is to establish Experimental Climate Forecast Centers. These Centers will develop and test objective climate prediction methods and demonstrate their readiness for operational testing. The National Climate Program Office has reviewed a number of proposals and expects to announce within the next month the award of the first grant for such a Center.

Category II: Responding to Impacts and Policy Implications of Climate

In the area of Responding to Impacts and Policy Implications of Climate there are two Principal Thrusts. One is Carbon Dioxide, Environment and Society, and the other is Climate and World Food Production. The former is led by the Department of Energy, the latter by the Department of Agriculture.

Carbon dioxide concentrations in the atmosphere continue to increase. A comprehensive program is underway to obtain facts about this increase, its causes and future course. We seek to understand the climatic response to be expected, to examine the direct and indirect environmental, economic and societal consequences of this increase, and to explore the options that may be available to ameliorate any undesirable impacts. Scientists both here and in other nations have been meeting over the last year to plan programs of study and research, to discuss the results of research to date, and to assess the status of our current understanding of the relevant issues. One notable study, recently commenced, is an extensive investigation of the oceans' ability to transport excess CO_2 from the surface to deep waters. This program, titled Transient Tracers in the Oceans, is supported by both the National Science Foundation and the

Department of Energy. It will provide important insights into the role of the oceans in absorbing some of the warmth that a CO_2 greenhouse effect must produce, delaying therby the time when climate changes may be noticeable in the atmosphere. Careful studies of atmospheric temperatures still do not show evidence of any CO_2 climate effect to date, and new model calculations tend to confirm that the large heat capacity of the oceans will delay the appearance of effects, perhaps by a decade or two, but that some effects nevertherless will occur.

An important document that describes the full range of activity within this principal thrust of the National Climate Program is the recently published "Research Issues and Supporting Research of the National Program on Carbon Dioxide, Environment and Society," prepared by the Department of Energy as lead agency for this effort. I have included a copy of this Report for the Subcommittee as part of my formal submission today.

The basic objectives of the Principal Thrust in Climate and World Food Production are to increase our understanding of and ability to measure the impact of climate on food-producing systems; to maintain current assessments of the impact of climate on national and world food production and use them as tools for evaluating strategies for dealing with variable food supplies; and to identify and provide the climate information and services needed for more efficient and stable food production and for the conservation and management of natural reseaources used in food production. The program for this Principal Thrust includes (1) Department of Agriculture (USDA) continuing outlook and situation analyses of national and world agricultural production, supported in part by joint USDA/NOAA weather and climate analyses; (2) USDA, NOAA and NASA joint research on the use of aerospace and other advanced technology to assess agriculatural production and to inventory natural resourses; and (3) a broad program of basic and applied research which includes analyses of climate effects and interactions with production.

Category III: Understanding Climate

The 5-Year Plan also identifies two high priority activities in support of Understanding Climate. One of these consists of investigations of the important role of Earth and Solar Radiation in affecting climate, and the other deals with Ocean Heat Transport and Storage. Lead agencies for these activites are, respectively, NASA and NSF. It is informative to note the close relationship of these two priority efforts in the National Climate Program to the World Climate Research Program. Under the joint leadership of the World Meteorological Organization and the International Council of Scientific Unions, a preliminary plan for this major international effort has identified two climatologically significant processes as "requiring particular attention." These are Cloudiness and Radiation, and Ocean Processes. This very close correspondence between the international and our national research priorities will make easier the important task of encouraging international cooperation in achieving our goals.

The sun is the source of the basic energy that drives the climate system. Incoming solar radiation and outgoing earth radiation are affected by factors such as clouds, trace gases, aerosols and surface reflectivity. The objective of the Principal Thrust in Solar and Earth Radiation is to measure and understand these factors. One of the most important aspects of this activity is the planning for the Earth Radiation Budget Satellite Experiment, which will involve special instruments added to NOAA operational satellites and a complementary experimental satellite to be lauched by NASA. This significant experiment is expected to take place in 1984. In addition, important related studies have been proceeding.

Two events of note within the last year involved the very careful measurement of the total solar output of radiant energy (called the "solar constant") and the eruption of Mt. St. Helens, which provided a unique opportunity to acquire important measurements of the effects of a volcano on climate. The solar constant measurement was undertaken by two NASA satellites, NIMBUS-7 and the Solar Maximum Mission. They obtained corroborating measurements showing small decreases in total solar irradiance that lasted for periods of 7 to 10 days in 1980, and which appear to correspond to the occurrence on the sun of certain sun spot groups. This is the first confirmed measurement of a small variation of solar output corresponding directly to solar activity.

Investigation of the climatic effects of the Mt. St. Helens volcanic eruption was facilitated by the presence in orbit of two NASA satellites, NIMBUS-7 and AEM-2, equipped to monitor stratospheric aerosols. These were supported by additional aircraft and surface based measurements. A special workshop conducted by NASA for the National Climate Program concluded that the Mt. St. Helens eruption could have only minimal climatic effects, not because it was not a substantial eruption, but rather because it emitted relatively little sulphur dioxide into the stratosphere where small sulfuric acid droplets might form and persist.

The last of the Principal Thrusts is the investigation of Ocean Heat Transport and Storage. Two important new research programs were initiated by NSF in 1980, PEQUOD (Pacific Equatorial Ocean Dynamics) and SEQUAL (Seasonal Equatorial Atlantic Experiment), that will contribute significantly to our understanding of the oceans' role in climate. In addition a study is being completed for the National Climate Program Office by the University Corporation for Atmospheric Research on a strategy for ocean climate monitoring. This analysis is expected to provide important guidance for future programs, both national and international, to monitor the world's oceans.

This completes the list of the highest priority activites of the National Climate Program, but it does not complete the list of all the important activities or recent progress. These will be listed more completely in the Annual Report on the National Climate Program for Fiscal Year 1980, which is currently in a final drafting stage, and will be transmitted to Congress as soon as all the necessary material is assembled.

I will conclude by calling your attention to a recent publication of the NOAA Environmental Data Service. It is a Climate Impact Assessment of the United States for 1980 prepared by the Center for Environmental Assessment Services. It is estimated that climatic events gave rise, in 1980, to total losses in excess of $25 billion. Some of the highlights of this report are:

- * Agricultural losses totaling near $19 billion, of which the summer heat wave and drought accounted for about $18 billion.
- * Electric energy consumption skyrocketed to record levels due to the heat wave. The anomalous heat gave rise to additional cooling costs, nationally, of $1.4 billion.
- * Evidence that major weather and climate induced losses contributed substantially to the nation's inflation.

Climatic extremes exactly like last year's are unlikely to be repeated soon. But every year will have its own stamp of unusual or unexpected sequences of weather. By providing better and more information about climate and its effects, and through programs that encourage the utilization of this information in the planning and management of climate sensitive activities, we hope to improve our ability to respond to the inevitable vascillations of climate.

As you are no doubt aware, the President is presently considering a series of budget initiatives for Fiscal Year 1981, 1982, and beyond. To assure continued progress in the National Climate Program, the Administration expects to submit shortly a Bill to reauthorize appropriations for the Program for Fiscal Years 1982 and 1983 in accordance with the President's message to be delivered March 10, 1981. The Administration's Bill is also expected to request an amendment to Section 7 of the National Climate Program Act to change the date when the Annual Report on the Program is due from January 31 to March 1. This change is necessary to allow us to include in the report the required information on the budget requests for the subsequent fiscal year.

This concludes my prepared testimony, Mr. Chairman. I will be glad to respond to any questions you may have.

Mr. SCHEUER. Well, I thank you for your testimony, Dr. Epstein, and for your very interesting and thoughtful remarks, Mr. Belsky, and we look forward to working with both of you.

We will now move on to Dr. Werner Baum. Now, Dr. Baum, I have to say before you start, the senior chairman of the full committee, Don Fuqua, was very eager to be here to introduce you. He has an extraordinarily high regard for you. I'm disappointed that he isn't here to do it himself, and I will hold the introduction for when he does come, and simply welcome you. Thank you for your very thoughtful testimony which I have read with great interest, and will be printed in full in the record. Why don't you just chat with us informally, and be prepared to be interrupted if Congressman Fuqua happily arrives while we are still here.

STATEMENT OF DR. WERNER BAUM, CHAIRMAN, NATIONAL CLIMATE PROGRAM ADVISORY COMMITTEE

Dr. BAUM. Thank you, very much, Mr. Chairman. If you will permit me to elaborate on that personal observation just slightly, this is really a most-remarkable set of circumstances, but as a former president of the University of Rhode Island, chancellor emeritus of the University of Wisconsin/Milwaukee, I find that the composition——

Mr. SCHEUER. The chances are a million to one that you couldn't possibly be about to say what you are starting to say.

Dr. BAUM. I find the composition of this subcommittee meeting rather remarkable, and it turns out Mr. Carney tells me he is an alumnus of Florida State University.

Mr. SCHEUER. That is amazing. It is utterly remarkable, and defies all the known laws of chance.

Dr. BAUM. Yes. With your permission, Mr. Chairman, since my statement is so very brief I would like to present it.

Mr. SCHEUER. Please do.

Dr. BAUM. I appear here this morning in my capacity as chairman of the statutory National Climate Program Advisory Committee. This hearing having been called on short notice, and our committee being dispersed across the Nation, I have not been able to obtain committee consideration of this testimony. The views expressed, therefore, must be considered my own, though I am confident they reflect the general sentiments of our membership.

It is important to recall that the national climate program is basically an initiative of the Congress, and of course, of Mr. Brown in particular. It reflects your perception of national concern over recent fluctuations in climate and their impact on our economy and society. The previous administration did not seem to share your concern, and that of many citizens, and did not seem to recognize the potential for increased national productivity inherent in the development and application of climatic knowledge.

With a very few notable exceptions, the national climate program is proceeding at the proverbial snail's pace, largely due to lack of application of human and fiscal resources, partly due to organizational difficulties.

One notable exception is the development of the 5-year plan under the leadership of the National Climate Program Office with the participation of numerous Government agencies, external groups, and interested individuals. The plan did take somewhat longer than had been anticipated to develop because of the involvement of so many people, but it had been well received, generally speaking, by the wide spectrum of producers and users of climate information.

The second notable exception is the work on the carbon dioxide problem, which is proceeding acceptably, and which will be discussed in greater detail by Dr. Suomi.

Let me emphasize the two most striking weaknesses relative to your wishes and expectations in legislating the national climate program. One of them is the intergovernmental climate program and the associated building and dissemination of data and information sets. There is a virtually unanimous conviction in the community that the intergovernmental climate program is the way to capitalize most effectively and quickly on what we already know about climate.

The short-range payoff from an effective intergovernmental climate program could be of major consequence to farming, shipping, water resource utilization, and numerous other endeavors. Yet the former administration, apparently within the National Oceanic and Atmospheric Administration, the Department of Commerce, the Office of Science and Technology Policy, and the Office of Management and Budget—and I mean all of them—failed to support this effort at more than a token level, The entire intergovernmental climate program now consists of a handful of demonstration projects, each funded at trivial amounts. The intergovernmental climate program, which is based on what we already know about climate, and not dependent on any research breakthroughs, deserves major emphasis.

The second striking weakness is the failure to develop experimental forecast centers as called for in the legislation. If we are ever to have useful seasonal or annual climate forecasts—which it may take decades to develop, but which would be of enormous economic and social value—we are wasting irretrievable time. While the world's food and water requirements increase daily, with shortages steadily becoming more apparent, we are not moving perceptibly on a program which could provide a partial solution to more effective use of these absolutely vital resources.

Let me also address briefly the organization difficulties I mentioned earlier, and these really should not come as a surprise. If I remember correctly, when the legislation was under consideration back in 1978 Congressman Brown expressed a feeling that it was as much an experiment in public administration as it was a venture to improve our understanding and use of climate.

Mr. **Scheuer**. He didn't know how right he was.

Dr. **Baum**. He recognized the situation very well, and the experiment, it has already been made clear, has its problems. As the national climate program is now structured, the National Climate Program Office does not have authority commensurate with its responsibility. The Director of the Office is embedded relatively deep within the NOAA structure, has limited influence on NOAA's own climate activities, and even less on those of other participating departments and agencies, and has practically no fiscal resources to apply toward specific objectives. It is doubtful that the program as structured could succeed even if we were not in an era of financial strains. Under the prevailing circumstances, a change in management structure seems absolutely necessary.

I take it for granted that the National Climate Program Act will be reauthorized, as it addresses an issue of major importance to the United States. However, I urge you to limit the extension to 1 year. I urge that prior to the next expiration, the Congress and/or the administration establish a mechanism to review options for management arrangements and to generate recommendations for amendments to the act in 1982.

I recommend also that you relax the requirement for biennial submission of revised 5-year plans. The funds and time devoted to this planning process could be better applied to substantive program activities, given the slow start and the shortage of resources.

Finally, I do not plead for increased dollar authorizations for NOAA or for Commerce. I do question the application of available resources, especially under the stringent circumstances bound to prevail in the near term. NOAA has increasingly become a regulatory agency rather than a science and service agency. I hope that the Congress and the new administration will carefully consider opportunities to divert some resources from regulatory activities to activities designed to improve our productivity, increase our understanding of climatic fluctuations, and enhance our ability to deal with them.

That concludes my prepared statement, Mr. Chairman. I would be glad to answer questions, or enter into any general discussion.

[The prepared statement of Dr. Baum follows:]

(Testimony before U.S. House of Representatives Committee on Science and Technology, Subcommittee on Natural Resources, Agriculture Research, and Environment; March 5, 1981)

Werner A. Baum

Chairman, National Climate Program Advisory Committee
Chancellor Emeritus, University of Wisconsin-Milwaukee
Dean of the College of Arts and Sciences, Florida State University

Mr. Chairman, Members of the Committee:

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Let me emphasize the two most striking weaknesses relative to your wishes and expectations in legislating the National Climate Program. One of them is the Intergovernmental Climate Program and the associated building and dissemination of data and information sets. There is a virtually unanimous conviction in the community that the Intergovernmental Climate Program is the way to capitalize most effectively and quickly on what we already know about climate. The short-range payoff from an effective Intergovernmental Climate Program could be of major consequence to farming, shipping, water resource utilization, and numerous other endeavors. Yet the former Administration, apparently within the National Oceanic and Atmospheric Administration, the Department of Commerce, the Office of Science and

Technology Policy, and the Office of Management and Budget--and I mean all of them--failed to support this effort at more than a token level. The entire Intergovernmental Climate Program now consists of a handful of demonstration projects, each funded at trivial amounts. The Intergovernmental Climate Program, which is based on what we already know about climate and not dependent on any research breakthroughs, deserves major emphasis.

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Let me also address briefly the organizational difficulties I mentioned earlier. As the National Climate Program is now structured, the National Climate Program Office does not have authority commensurate with its responsibility. The Director of the Office is embedded relatively deeply within the NOAA structure, has limited influence on NOAA's own climate activities and even less on those of other participating departments and agencies, and has practically no fiscal resources to apply toward specific objectives. It is doubtful that the Program as structured could succeed even if we were not in an era of financial strains. Under the prevailing circumstances, a change in management structure seems absolutely necessary.

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Mr. Chairman, I would be pleased to answer any questions now or later.

Mr. SCHEUER. Thank you very much, Dr. Baum. We will come back to you when we finish with the next two witnesses for questions. We appreciate your very thoughtful testimony.

We will now hear from the third witness, Prof. Verner Suomi, chairman of the Climate Board, Assembly of the Mathematical and Physical Sciences of the National Academy of Sciences.

We are very happy to have you here, Dr. Suomi. You have submitted prepared testimony. That will be printed in full in the record, so why don't you chat with us informally for 8 or 10 minutes?

STATEMENT OF DR. VERNER E. SUOMI, CHAIRMAN, CLIMATE BOARD ASSEMBLY OF MATHEMATICAL AND PHYSICAL SCIENCES, NATIONAL ACADEMY OF SCIENCES

Dr. SUOMI. Thank you, Mr. Chairman. for providing me with this opportunity to make a statement on the National Climate Program Act.

I emphasize at the outset that except where I specifically refer to the published report which is in the submitted statement, that the views I express here are my own, and not necessarily those of the Climate Board or of the National Academy of Sciences.

What I would like to do, Mr. Chairman, is to tell you about some things that are good. There have been really some remarkable successes in the climate and weather-related activities of the Nation in the last year or so.

As Dr. Baum has already testified, the carbon dioxide and climate problem is in good hands. It is certainly not in good order, but at least it is in good hands. The most interesting result of activities is that the problem refuses to go away. One can read further about the CO_2 problem in the latest issue of Science under the "AAAS Report." We have already submitted a report of one of the panels on this subject. It is an important problem of the future, and we have to get at it as soon as possible.

I liken it to the problem of "don't know squared," that is, many of us don't know that we don't know. We certainly have to get that cleared up because it is such an important question.

So you already have our reports, and I suggest they be read very carefully. A second area that rates a very high grade is research at improving our understanding of how the climate system works, because it is moving forward at a rapid pace. After more than a decade of planning the global weather experiment was successfully carried out in 1979. With the help of virtually every nation on Earth we put in place for a few months a system of satellites, ships, ocean buoys, aircraft, and ground stations to observe our planet properly for the first time in history.

The results are coming in now. It is only 1 year since the observing phase closed, and for example, the investment is paying off. The European Center For Medium Range Weather Forecasts has shown that really useful forecasts can be reliably made for almost a week in advance. Moreover, the onset and decay of blocking circulations that produce extended rains and droughts may soon be predictable.

With these new observations we learned that our notions of the Southern Hemisphere were woefully inadequate. The mariners talk about the roaring forties. While 1979 might have been an anomalous year, observation showed the storms to be much more intense, and I think the "screaming forties" in the Southern Hemisphere would be more appropriate.

That program only cost about 300,000 dollars worth of ocean buoys, and we didn't pay for many of them. The rest of the world provided most of them. We did provide space on Tiros-N spacecrafts. France provided the electronic equipment on the spacecrafts and reduced the data.

Recently the monsoon experiment was reported on a conference in Tallahassee. This program took place at the same time, giving us the first detailed look at the Asian monsoon. Its onset determines whether a large fraction of mankind is going to eat or starve. We learned that it is not just an Indian monsoon, it is a global monsoon. Moreover, we gleaned some valuable hints on how to predict its onset and result.

The global weather experiment, mainly designed to help predict weather, also told us a very great deal about climate even though we have so far only peeked at the mass of data collected. Further research on the data at a cost, and much less expensive than acquisition, will yield much more.

We must be very careful in the present cutback of funds not to allow this tremendous store of the record to gather dust. It doesn't help to gather dust. The data needs to be exploited.

So the nations and international organizations that have carried out the global weather experiment are now planning a decade of research focused on climate, and we should participate with that. We already have some hints that better knowledge of the ocean may lead to useful forecasts of climate. I do not think we can ever solve the problem without having a better understanding of the role of the ocean. As you look around at the photos in this auditorium and look at our Earth, you can see it is a blue Earth. Much of that is true because of the ocean, as well as the scattering from the atmosphere.

We have had some recent hints that better knowledge of the ocean will lead to useful forecasts of climate. For example, Professor Wallace of the University of Washington has found some clear link between equatorial/Pacific Ocean temperature anomalies and climate in the United States a season later.

Indeed, there are hints of maybe 1-year advance warnings of severe North American winters. Now, it is not all put to bed, these are just hints, but at least it is a light at the end of a very dark climate prediction tunnel, and it would be a shame if we did not pursue this lead further.

Thus, I believe that the international organization of other programs to be carried out under the world climate research program are soundly conceived and properly focused. They have a high probability of paying off handsomely in the near term, as well as in the future. They merit strong support in our own self-interest.

Their successful execution will depend on a strong infrastructure of satellite observing platforms, operational weather and oceanographic observations from many countries, and viable international, intergovernmental, and nongovernmental organizations to hold it together.

So pennypinching tinkering with the foundation for these efforts could bring them crashing down in short order. In particular, we must continue support for completion of research based on the global weather experiment, maintain basic observations and complete extraction data sets covering both land and ocean, and implement without loss of momentum the ocean-climate studies being planned for this decade.

Now I am going to skip over, in the interest of saving time, not read those parts of the submitted written testimony which I have graded "B" or "C" and go to the last section, which I think is very important. It is about the problem of program planning and management.

A second institutional expermient of Congress was the establishment of a National Climate Program Office to coordinate the activities and the Federal agencies participating in the program. The performance of this central mechanism only rates a "D", although the individuals in the Office deserve an "A" for effort.

The mechanism for coordination provided to the Office in the act consisted of a mandate to develop a 5-year plan and a requirement that the agencies submit their climate-related budget requests to the Office of Management and Budget as an integrated package.

The Program Office was given no real authority. The climate projects proposed by each agency had to survive the review in terms of that agency's individual priorities before they could be considered as part of the national program. Since little additional money was, in fact, made available, climate efforts tended to compete with, and often lose to, other activities.

Even within the lead agency, NOAA, climate activities, including support for the National Climate Program Office, must compete with other pressing and important responsibilities in an austere budget environment. And it is likely to get worse. With an inadequate staff, no budgetary authority over others, slender funds for coordination and startup activities, and distracted support from its parent agency, the Office was an undersized puppetmaster trying to move strong-willed marionettes with no strings. These concerns were also expressed in the Board's 1979 workshop report.

Thus, it is not surprising that the 5-year plan for the program was a year late, and that the elements of the program requiring interagency collaboration in innovative ways are lagging. Under these circumstances, the mere existence of substantial progress as indicated in my report card demonstrates a widespread perception of the importance of climate to the missions of many agencies.

In my view, Mr. Chairman, the national climate program could be greatly advanced by strengthening the National Climate Program Office. I must note some conflict of interest here, since the Office supports in large part the work of our Board.

Nevertheless, it seems clear enough that a vigorous, complex, and multifaceted program such as this must have strong leadership. Several constructive steps might be advanced.

The Office needs adequate budgetary and personnel resources of its own. It must have the funds to provide the essential glue for interagency and intergovernmental efforts, and it must be able to recruit its own high-quality personnel rather than relying on borrowed personnel.

The Office needs stronger budgetary authority over climate-oriented programs from the participating agencies. One of these mechanisms might be to give the Office control of a body of discretionary funds to be employed in jointly funded projects with the agencies.

The establishment of a mechanism for a strong and rapid resolution of interagency disagreements should be considered. The Climate Program Policy Board provides a forum for the discussion of these issues but may not be sufficiently effective for their resolution. The Climate Board's 1978 workshop suggesteed a role for the Office of Science and Technology Policy in this regard, and no doubt there are other mechanisms.

To sum up, I believe that the national climate program is directed at pressing national needs. Its successful implementation will greatly advance our national productivity and well-being. Its performance to date is spotty but merits an overall passing grade. We are making great progress in understanding climate and climate mechanisms, and what man may do to it.

We are doing useful things to improve Federal capabilities to handle climatic data and to provide basic services. But we are lagging in the tasks that should be easiest, helping Federal agencies and States to work together in effective partnerships and finding out how much climate can help or hurt us. One way to accelerate the progress of this wagon train—and it is a wagon train—will be to give the driver some better reins, or maybe even a whip.

Now, Mr. Chairman, these last remarks sound very harsh. But I am reminded of my daughter's remarks about her college education. "I learned the most," she said, "from the professors who corrected my papers harshly and returned them bleeding. They chopped my head off, but they were right there to glue it back on again."

Thank you, Mr. Chairman, for the opportunity to present my views.

[The prepared statement of Dr. Suomi follows:]

PREPARED STATEMENT OF DR. VERNER E. SUOMI, CHAIRMAN, CLIMATE BOARD ASSEMBLY OF MATHEMATICAL AND PHYSICAL SCIENCES, NATIONAL ACADEMY OF SCIENCES

03/03/81

Thank you, Mr. Chairman, for providing me with the opportunity to make this statement on the National Climate Program. I should emphasize at the outset that--except when I specifically refer to a published report--the views I will express are my own, not necessarily those of the Climate Board or of the National Academy of Sciences.

Events of the past year have forcefully reminded us that the variability of climate greatly affects our national welfare. Last summer's widespread and extended heat wave and drought caused about 1300 heat-related deaths and an estimated 18 billion dollars in agricultural damages. Moreover, we are continuing to pay the price of this climatic surprise through higher food costs. The hot, dry summer was followed by a dry autumn and a cold dry winter. The price of orange juice reflects the record freeze in Florida. Perhaps, more significantly, reservoirs in the northeast are at perilously low levels, and water restrictions are beginning to affect our industrial productivity as well as our comfort. The mighty Mississippi has become a trickle, and the barge traffic so vital to our grain exports has been reduced to 50 percent of capacity. Despite our technological prowess, our complicated modern society is still highly sensitive to fluctuations in climate.

As we look to the future, we see no lessening in this sensitivity, but rather a looming problem of climate change. It appears highly likely that man-made increases in atmospheric carbon dioxide will produce noticeable climatic changes within the lifetimes of the majority of our population. Although we are not yet certain of the magnitude and distribution of these changes, a Climate Board panel, whose report I would like to submit for the record, concluded that such man-made global changes would pose difficult and divisive problems for mankind.

Climate not only presents risks, it also offers opportunities. Our national smorgasbord of varied climates that permit us to grow both oranges and cranberries and let us sunbathe or ski is by no means the least of our national resources. Wise use of our considerable knowledge of our climatic resources can greatly improve our economic productivity and keep us from taking unnecessary climatic risks. A recently-published report of one of our panels, Managing Climatic Resources and Risks, offers suggestions on how we can best make use of what we know about climate. I am pleased to submit this report also for the record.

In enacting the National Climate Program Act, the Congress displayed great wisdom and foresight. It recognized that, since climate affects all aspects of our society, no single agency of government can respond adequately to its challenges. Thus, an interagency program was established, with leadership resting in the agency most closely associated with climate. Now, two and a half years after the Act became law, is an appropriate time to give a midterm examination to the program. In my view, the program gets a passing grade but could do a lot better. Exercising my prerogatives as a college professor, I would give some aspects of the program an "A," and others a "D-"--maybe even an "F." I will first give the good news, the clearly passing grades.

Carbon Dioxide and Climate

The carbon dioxide research and assessment program, a principal thrust of the National Climate Program led by the Department of Energy, clearly merits an A. The Department has designed a comprehensive and logically organized program and has enlisted the participation of some of the country's most capable scientists in its execution. Even at this early date, valuable scientific results are emerging, and our understanding of this exceedingly complex problem is beginning to sharpen.

To me, the most interesting result is that the problem refuses to go away. True, the rate of growth of fossil fuel combustion is slackening, and some scientists have quibbled over details of the projected effects of man-made carbon dioxide injections. Nevertheless, the broad inferences first drawn over a century ago remain valid: By burning huge amounts of fossil carbon, we are performing a vast and uncontrolled geophysical experiment on our planet. Its most likely major effect will probably be to warm the earth, but regional changes in precipitation and other aspects of weather will almost certainly also result. It seems obvious that these changes will help some countries and harm others. We must foresee the consequences of our energy policies as clearly as we can, and it seems obvious to me that the carbon dioxide research and assessment program deserves strong continuing support.

In enacting the Energy Security Act, the Congress became sufficiently concerned about this problem to ask the Academy for an independent comprehensive assessment of the issue. The Climate Board, with support from the Office of Science and Technology Policy and under the leadership of Professor William A. Nierenberg, has developed a proposal for carrying out this study, and we are now awaiting funding so that we can get on with it. Needless to say, we will draw upon the results of the DOE program while maintaining sufficient independence to ensure that Congressional needs for unbiased judgments are met.

Climate System Research

A second area rates at least a midterm grade of "A." Research directed at improving our understanding of how the climate system works is moving forward at a rapid rate and is producing remarkable results with huge potential payoffs.

After more than a decade of planning, the Global Weather Experiment was successfully carried out in 1979. With the help of virtually every nation on earth, we put in place for a few months a system of satellites, ships, ocean buoys, aircraft, and ground stations to observe our planet properly for the first time in history. The results are coming in now, and I am here to tell you that our investment is paying off. The European Center for Medium Range Weather Forecasts has shown that really useful forecasts can be reliably made for almost a week in advance. Moreover, the onset and decay of the "blocking" circulations that produce extended rains and droughts may soon be predictable. With decent observations, we have found that our notions of the climate of the southern hemisphere were woefully inadequate. The mariners' "roaring forties" are really the "screaming forties"--the weather of the southern ocean is much more violent than we had thought. Moreover, with just $300,000 worth of ocean buoys we can turn out good forecasts for half the world.

The Monsoon Experiment conducted at the same time let us take the first detailed look at the Asian monsoon that determines whether a large fraction of mankind eat or starve. We learned that it is not just an Indian monsoon; it is a global monsoon. Moreover, we gleaned some valuable hints on how to predict its onset and development.

So the Global Weather Experiment told us a lot about climate, even though we just peeked at the mass of data it yielded. Further research on the data (that will be much less expensive than acquisition of the data) will yield much more.

The nations and international organizations that carried out the Global Weather Experiment are now planning a decade of research focused on climate. Our globe is 70 percent ocean, so this research emphasizes observation of the ocean. The whole atmosphere, the whole ocean, all the land and ice form a unified climate system; hence, we need global observations, and satellites are the only way to get them. The earth belongs to many nations, and the job is too big for any one country; hence, we must have multilateral international efforts. Our planet is a big one; hence, we must have "big science" programs. Such programs are now being planned by the cream of the world's scientists; and the Climate Board is forming a blue-ribbon committee to advise on U.S. participation in them.

We already have some hints that better knowledge of the ocean may lead to useful forecasts of climate. Professor Wallace at the University of Washington has found clear links between equatorial Pacific ocean temperatures and North American climate some six months later. Indeed, there are hints of one-year advance warnings of severe North American winters. Similar investigations by J. O. Fletcher of the National Oceanic and Atmospheric Administration and a number of theoretical studies here and abroad reinforce the inference that at least some climate anomalies can be predicted.

Thus, I believe that the international observation and research programs being planned under the World Climate Research Program are soundly conceived and properly focused. They have a high probability of paying off handsomely, in the near term as well as in the future, and merit strong support in our own self-interest. But we must bear in mind that their successful execution will depend on a strong infrastructure of satellite observing platforms, operational weather and oceanographic observations; and viable international, intergovernmental and non-governmental organizations. Penny-pinching tinkering with the foundation for these efforts could bring them crashing down in short order. In particular, we must continue support for completion of research based on the Global Weather Experiment, maintain basic observations and data sets covering both land and ocean, and implement without loss of momentum the ocean-climate studies planned for this decade.

Climate Information

I would award a "B-" to another "principal thrust" of the program, the generation and dissemination of climate information. Of course, our national weather service has been dealing with climatological data for generations, and the Air Force and Navy have made outstandingly successful use of climatological information. But the National Climate Program legislation prompted a more organized assessment of user needs, the consolidation and expansion of a number of service functions into the Climate Analysis Center, and preparation of a useful Climate Data Inventory. It is worth noting that this inventory is providing the basis for an international data referral service being developed by the World Meteorological Organization. These are unglamorous but essential activities that greatly further the objectives of the program. It is unfortunate that the Experimental Forecast Centers called for in the legislation have been so slow in development, but a start is at last being made.

Climate Impact Assessment

A "C" might be awarded for climate impact assessment. Congress gave top billing in the National Climate Program Act to "assessments of the effect of climate on the natural environment, agricultural production, energy supply and demand, land and water resources, transportation, human health and national security." As I noted earlier, the impacts of droughts, heat waves, and other climatic phenomena can be very substantial--in some years, many billions of dollars and hundreds, perhaps thousands, of lives. We are also learning that, for example, adverse weather in the Soviet Union can have critical economic and national security implications for the United States. We clearly must learn much more about how climate interacts with human activities if we are to reduce adverse impacts in the future.

Various federal agencies have made some progress in this critical area. For example, the Center for Environmental Assessment Services of the National Oceanic and Atmospheric Administration has begun issuing monthly reports on climate impacts in the United States, information of considerable potential use for planners and policymakers. The U.S. Department of Agriculture has begun to incorporate more and better climatic information into its policy analyses and decision processes relating to food supply worldwide. In many instances, however, federal efforts could be stronger. For example, although several different agencies have been actively monitoring the winter's drought situation, none have yet been able to take a broad, national view that includes an active response now to prevent possible future losses. We believe that a strong interagency focus on impacts assessment could help remedy this situation in the future. Indeed, we have established an ad hoc Panel on Climate Impacts to help the National Climate Program Office begin to formulate an effective federal program.

Intergovernmental Climate Program

Now for the bad news--the failing or barely passing grades. In the National Climate Program Act, Congress attempted two institutional innovations. First, it called for an Intergovernmental Climate Program, recognizing that, while many climate data and information services could most efficiently be "wholesaled" at the federal level, others could best be "retailed" at the state level. Moreover, the real needs of users are most acutely perceived at the state level, and some regional consortia already existed as a basis for the program.

The Climate Board's 1979 workshop expressed deep concern over the delay in the start of substantive activities in this program. Eventually, token sums were made available. However, it appeared that the former Administration viewed this program simply as a potentially bottomless "pork-barrel," or "soup-line" boondoggle. Our view, which I believe was also Congress's view, is precisely contrary. The objective of the Intergovernmental Climate Program is to increase our national productivity by mobilizing local, state, and regional resources to meet needs at those levels, leaving the federal government to concentrate on cost-effective provision of standardized national services. We believe that this imaginative and far-sighted initiative of Congress should be vigorously implemented, and we have established a Panel on Intergovernmental Climate Programs (of which Dr. Baum is a member) to make concrete suggestions on how these efforts may best be advanced. For example, technological progress in small computers seems to offer great opportunities for making data resources and advanced techniques widely available.

Program Planning and Management

A second institutional experiment of Congress was the establishment of a National Climate Program Office to coordinate the work of federal agencies participating in the program. The performance of this central mechanism rates a "D," although the individuals in the Office deserve an "A" for effort. The mechanisms for coordination provided to the Office in the Act consisted of a mandate to develop a five-year plan and a requirement that agencies submit budget requests for their program activities to the Office of Management and Budget for review as an integrated package. The Program Office was given no real authority, and climate projects proposed by each agency had to survive review in terms of that agency's individual priorities *before* they could be considered as part of the program. Since *little* additional money was in fact made available, climate efforts tended to compete with, and often lose to, other activities. Even within the lead agency, NOAA, climate activities--including support for the National Climate Program Office--must compete with other pressing and important responsibilities in an austere budget environment. With an inadequate staff, no budgetary authority over others, slender funds for coordination and start-up activities, and distracted support from its parent agency, the Office was an undersized puppet-master trying to move strong-willed marionnettes with no strings. These concerns were also expressed in the Board's 1979 workshop.

Thus, it is not surprising that the five-year plan for the program was a year late, and that the elements of the program requiring interagency collaboration in innovative ways are lagging. Under these circumstances, the mere existence of the substantial progress I have indicated in my report card demonstrates a widespread perception of the importance of climate to the missions of many agencies.

In my view, the National Climate Program could be greatly advanced by strenghtening the National Climate Program Office. I must note some conflict of interest here, since the Office supports in large part the work of our Board. Nevertheless, it seems clear enough that a vigorous, complex, and multifaceted program such as this must have strong leadership. Several constructive steps may be advanced:

1. The Office needs adequate budgetary and personnel resources of its own. It must have funds to provide the essential *glue* for interagency and intergovernmental efforts, and it must be

able to recruit its own high-quality personnel rather than relying on borrowed personnel.

2. The Office needs stronger budgetary authority over climate-identified programs of participating agencies. One mechanism might be to give the Office control of a body of discretionary funds to be employed in jointly funded projects with the agencies.

3. Establishment of a mechanism for strong and rapid resolution of interagency disagreements should be considered. The Climate Program Policy Board provides a forum for the discussion of such issues but may not be sufficiently effective for their resolution. The Climate Board's 1978 workshop suggested a role for the Office of Science and Technology Policy in this regard, and no doubt still other means are possible.

Conclusions

To sum up, I believe that the National Climate Program is directed at pressing national needs. Its successful implementation will greatly advance our national productivity and well-being. Its performance to date is spotty but merits an overall passing grade. We are making great progress in understanding climate and what man may do to climate. We are doing useful things to improve federal capabilties to handle climatic data and to provide basic services. But we are lagging in the tasks that should be easiest--helping federal agencies and states to work together in effective partnerships and finding out how much climate can help or hurt us. One way to accelerate the progress of this wagon train will be to give the driver some better reins, and maybe a whip.

Thank you again, Mr. Chairman, for this opportunity to present my views.

Mr. SCHEUER. Thank you very much, Dr. Suomi.

We will now hear from Stanley Changnon.

STATEMENT OF STANLEY A. CHANGNON, JR., CHIEF, ILLINOIS STATE WATER SURVEY AND PRESIDENT OF AASC

Mr. CHANGNON. Thank you, Mr. Chairman.

As president of the American Association of State Climatologists I appreciate an opportunity to comment on the national climate program. We consider the program to be a very important activity, and strongly believe it to be in the national interest.

However, I'm going to direct most of my comments toward the intergovernmental climate program and the related provision of services and climate data to users; those parts of the national program that the State climatologists believe to be of singular importance if the benefits of the national massive efforts at data collection and research are ever to be realized in this country.

State climatologists, by the way, are State employees, typically working in State agencies or in State universitites. The rationale for the intergovernmental program is already very well developed in the earlier extensive testimony for the national climate program that several of us participated in several year ago.

The generation of climate data and information without the ensuing dissemination of products to users represents a classic failure in closing the loop. Congressional awareness of this important issue, the intergovernmental aspect and delivery of services, and awareness, I think, at the time of the known resistence to the intergovernmental program in the administration years ago, led to the detailed specification of the intergovernmental climate program in section 6 of the act.

Now we stand, 2½ years later, as you mentioned in your comments, Mr. Chairman, and a requested intergovernmental program esssentially has not been launched. The delay in implementation seems to stem from two factors, one of which might be considered timidity, or confusion, or a lack of commitment by NOAA's top leadership.

Second, is the apparent refusal of OMB to consider this cost-sharing Federal/State program. As these gentlemen here have said before me, the scientific community stands strongly behind the importance of the ICP and the dissemination of the existing information.

An alternative that was offered or developed 2 years ago to making the Federal/State program operational then, as mandated, or stated in the act, was one that centered around two cries. One was the "we need more demonstration of the economical value of climate products," and the second one was, "you don't know how to organize a Federal/State program."

In other words, someone had to demonstrate both the socioeconomic value of a dissemination effort, and also how to organize, manage, and conduct a Federal/State program. That is rather interesting, considering how many of these have been organized and conducted, but presumably, if all findings were positive from these demonstration efforts, the implementation of an intergovernmental program would, should, or could begin at some unspecified future time.

One suspects that some of these calls for demonstration were basically a tactic for delaying the intergovernmental program. Regardless of the reasons, the scientific community and the climate services groups, such as we are, after seeing the lack of action in the administration finally gathered around a concept of a phased-in approach to the intergonvernmental climate program.

Our association, for example, in 1979 recommended a phased-in approach toward a fully operational, all States up and operating, in the 5-year period. But that was 2 years ago, and nothing, of course, of substance has occurred.

Furthermore, the amount of resources spent on the intergovernmental climate program, or anything resembling it, is represented by $105,000 in fiscal year 1980 committed to five small demonstration projects. The amount is inadequate. Funding in fiscal year 1981 is stated to be potentially $200,000, and we have heard talk about there being a half a million dollars in the next fiscal year.

Of course, all of this is very uncertain. It is certainly well below the $5 to $6 million needed for a fully operational nationally functioning intergovernmental climate program, and it is also a mere fraction, or small fraction of the total Federal spending of over $115,000,000 for the climate program.

The National Climate Program Office has tried, in my judgment but has been largely unsuccessful, for many of the reasons that my colleagues have stated. Frankly, in my judgment, failure seems to have resulted from a lack of NOAA support and commitment to the Office. In fact, the Office has been too poorly funded to succeed in most of its mandated roles.

The national climate program as it stands now in this country is largely defined by the major programs at the mission agencies. What we perceived to be needed at the National Climate Program Office is a programmetic overview to help fill the gaps, as Dr. Epstein referred to, and to develop innovative planning of the programs like intergovernmental, and of the predictive research.

The implementation plan of the ICP, of intergovernmental is revealed in the 5-year national plan which you have seen, and which was issued many months late. The views of my association on this 5-year plan are available in a letter sent to Dr. Epstein, and I could proffer it to you if you wish. The highlights of our views are that we agreed the association found much in the national climate plan that we agreed with.

The identification of the six principal thrusts are in line with our thinking. However, although the priority of the information generation and dissemination thrust was very high in the document, one of the top six, its budgeting was not in line with its priority. If it is one of the six key areas of the national plan it seems ironic that the plan calls for funding of $2.8 million in fiscal year 1980 for this activity.

The $200,000 scheduled in fiscal year 1981 for the intergovernmental climate program represents only two-tenths of 1 percent of the total Federal budget in climate. It is really amazing priority setting, if you will pardon my observation.

The statement of plans for the information services, and in particular, the intergovernmental climate program and the plan are generally unclear, and of course, scheduling and milestones for moving ahead, even in a phased approach, are generally vague and nonspecific.

In summary, ladies and gentleman, I perceive that there are four key issues that our association feels affect this generation and dissemination of data. First, in our judgment, it has already been demonstrated widely that a well-focused Federal/State climate dissemination program provides marked benefits to individuals, the States, and to the Nation.

Further climate impact research is desparately needed, but further research over the next several years to prove the value of delivery of climate services from data that exists now is not necessary.

Mr. SCHEUER. You think there are unquestionably clear short-run benefits immediately to be obtained?

Mr. CHANGNON. Yes. I have with me, if you would like, two recent publications form the bulletin of the American Meterological Society that illustrate many applications of climate data in recent years, and I would be glad to provide those.

Mr. SCHEUER. There being no objection, we would like to include them in the record, along with this article that you have written, "Examples of Application of Climatic Data and Information" provided by State climatologists. We enjoyed that very much.

[The material follows:]

Examples of Applications of Climatic Data and Information Provided by State Climate Groups

Stanley A. Changnon, Jr.[1], Howard J. Critchfield[2], Robert W. Durrenberger[3], Charles L. Hosler[4], and Thomas B. McKee[5]

Abstract

The value of climate data and the information derived from the data still seems to be an unknown to many. Five persons engaged in providing climate services in different U.S. climatic zones have assembled a few widely different examples of recent uses of climate data and information. These help demonstrate the diversity of applications, and the value of the data and of those who can interpret them.

1. Introduction

There has been a growing awareness of the importance of climate to our national well-being, leading to the enactment of legislation in 1978 calling for a more focused and effective national program in climatology that would involve research, data collection, and services. One of the interesting ensuing debates over the dimensions of the national program has focused on the need and value of services element.

We who have long been involved in the provision of climate data and information to users found this debate to be both frustrating and challenging. We came to the realization that examples of climate-related services, so routinely performed in recent years, were not readily available. To those of us who have been involved in state-supported climatological programs, often as state climatologists, it came as a considerable surprise that a) there was any question as to the use of climatological data and information by a wide variety of interests, and b) many scientists and decision-makers did not realize the types of services reflected in handling requests for climate data and information.

This document aims to illustrate only a few of the applications of climate data and information services provided recently in five different climatic regions: the Pacific Northwest, the southwest desert, the Rocky Mountains, the Midwest, and the East Coast. We were involved in an assessment of the National Climate Plan in July 1979. At this meeting, we prepared a list of examples of applications of climate data and information to serve a variety of needs. Some of these have been combined to form this document. We stress that they are only examples and do not describe, by any means, the extent of our individual services efforts. They merely demonstrate the variety of services provided in recent years to various users in our climate. Hopefully, these examples will prove useful to those in the nation who are deciding on the value and need of sustaining, and indeed increasing, the limited state programs attempting to provide climate services.

2. Examples: Northwestern United States

The state highway department in Washington reviews climatic data on an annual basis to determine schedules for bridge maintenance, especially painting. Temperature extremes, the occurrence and duration of freezing temperatures, and ice forms of precipitation are major climatic factors used in their schedule decisions.

On a winter day in 1979, pontoon sections of a floating bridge capsized in a windstorm. Climatic data were provided to aid in the assessment of the cause and engineering errors, and in planning the design of a replacement bridge.

Banks in this region regularly use climatic data, such as extremes of temperature, precipitation, winds, or snowloads, to determine risks on mortgage loans for real estate they are considering.

A national insurance firm recently established significantly lower blizzard insurance premiums for livestock than prevail in the Great Plains and Midwest. These were determined as a result of a probability analysis of blizzard occurrence in the state's livestock-producing counties.

A major manufacturer of aircraft, which normally

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performs its own environmental monitoring, was faced with the loss of surface instrumental data required for evaluation of a series of test flights for a new multiengine jet. Provision of substitute climatic data derived at low cost saved the company the sizable cost of a complete repetition of the test flight series.

An insurance firm applied data on averages, extremes, and durations of temperatures above selected thresholds to determine the need for air conditioning systems in its fleet of company cars to be used in western Oregon and Washington.

3. Examples: Southwestern United States

A major lumber firm was investigating the possibility of the commercial production of a type of plant that produces oil-bearing seeds. The firm needed to know the limits placed on production of this plant by temperature conditions in a large portion of the American Southwest. Climate information was derived and supplied, becoming one of the factors that entered into the final decision not to proceed in this venture.

A group of investors wished to identify those areas where grapes might be produced in Arizona. A major concern was the length of the frost-free season and the number of growing degree-day units available at several sites. On the basis of the information from a special study of climate data, decisions were made to proceed and where to purchase land to start a major vineyard.

An individual had been injured as a result of lightning striking a power company pole. The plaintiff's lawyer charged negligence on the part of the power company because it had not provided lightning arrestors on the poles. The attorney was furnished with a statement assessing the frequency of thunderstorms in the region, a factor leading to the case being settled out of court for $1.5 million.

The nationally promoted base for calculating cooling degree-day units is 65°F. However, climate impact research showed that in the desert region, the use of air conditioning does not begin until the average temperature is 80°F. The cooling degree-day values for all communities in Arizona were revised to the base of 80°F. This information is now the basis for the design of structures and systems for the desert region and has resulted in energy savings and major reductions in capital costs.

Forecasts of gas and electricity use are based on climatological data. For most purposes the data used are the national normals for the period 1941–70. However, in the Phoenix metropolitan region, minimum temperatures in the summer are now 5°–7°F higher than they were 20 years ago due to urban growth. It was found that projections of temperatures—hence, energy use for cooling—were more nearly correct if normals based on the most recent 10 years were used rather than the 1941–70 normals.

4. Examples: Western Mountain area of the United States

Farmers in Colorado were asking the governor to proclaim more than half the counties as disaster areas so as to qualify for federal relief assistance. Before taking action, the governor sought a quantitative drought assessment. The state climatologist supplied an interpretation of the drought with a historical perspective for all counties. As a result, the governor declared certain counties as disaster areas, and they got relief assistance. Other counties seeking aid were not so declared.

The Bureau of Land Management (BLM) developed a rangeland model that required a climatological description of precipitation in five-day time increments through the growing season. The only usable daily precipitation data bases were available at the state climatologist's office, and a study was made for BLM. The results have been used in the management of more than 10 000 square miles over the past two years.

5. Examples: Midwestern United States

Soil temperatures in a midwestern state are monitored daily in the spring. These are coupled, on a weekly basis, with historical frequencies of daily precipitation data to develop probability prospects for planting of corn. There are many benefits from savings in work-time, energy expenditure, and seed-fertilizer losses.

In 1979, the Illinois Commerce Commission was considering a rate increase request of three natural gas firms. The decision to decline a rate increase that would have cost taxpayers $182 million in 1980 was based largely on a climatic study of the recent winters by the state climatologist. Direct study costs, excluding the cost of 90 years of data collection at eight sites, were $6500.

Illinois has obtained permission from the U.S. Supreme Court to use a different procedure for accounting for the water diverted from Lake Michigan for various uses in Chicago, its suburbs, and northeastern Illinois. The key issue was to go from a one-year accounting of diversion (limited to 3200 cubic feet per second) to 40-year accounting, mainly because there is now general recognition of the wet and dry periods of climate and acceptance of the ever increasing amount of rain in Chicago due to urban influences. As part of this diversion request, a climatological design study of heavy rainstorms was made, since the diversion must include storm rainfall. The diversion was contested by Wisconsin, which claimed that data from certain precipitation stations were invalid. The Illinois state climatologist made an in-depth assessment of the correctness of historical precipitation records for northeastern Illinois, and also furnished proof of the 15% rain increase in Chicago due to urban effects. Climatological information played a major role in resolving this water allocation issue.

6. Examples: Eastern United States

Climatological information was supplied to a commercial firm to design and market a pollution control system, including a special air quality monitoring network. As a result, power companies were able to meet pre-1977 clean air standards and still derive annual fuel savings of $5–$15 million at a cost of 10% of the savings. The Clean Air Act Amendment of 1977 declared such a system could no longer be used and must be replaced by more expensive process controls or stack scrubbers.

Climatology of winds and ocean waves was used by a commercial firm to design and market a system to optimize the routine and scheduling of transoceanic shipping. The savings for a 40-ship fleet was roughly $4 million annually at a cost of about 10% of the savings.

In Maryland, a public utility was prepared, on order from a regulatory commission, to construct a multimillion-dollar system to diffuse hot water into the bay. Calculations based on erroneous interpretation of climatic data by nonprofessionals (frequency and duration of extreme wet-bulb temperatures) had indicated that a serious violation of antithermal pollution regulations would occur. A climatological investigation revealed the error in the interpretation of the temperature data. Millions of dollars were saved, along with the energy necessary to construct the system and operate it for the lifetime of the power plant.

7. Summary

These limited examples reveal a wide variety of uses in planning designs and decisions, in operating issues, and for assessing events. Among those served were commerce and industry (transportation, insurance, food and fiber production and processing, and banks), design engineers, the legal profession, utilities, municipal agencies, state agencies, federal agencies, and, last but not least, the public. Actual savings are known in some instances, but these examples clearly reveal a multitude of values, both qualitative and quantitative. ●

announcements[1]

Conference on Antarctica weather and climate—Call for papers

The Royal Meteorological Society (Australian Branch), the Australian Academy of Science, and the University of Melbourne Department of Science and the Environment, are cosponsoring a conference on "Antarctica: Weather and Climate" during 11–13 May 1981. The conference is being hosted by the University Department.

The meeting is intended to provide a forum for discussion between research and operational workers with an interest in the Antarctic regions from the interrelated fields of meteorology, oceanography, upper atmosphere physics, atmospheric chemistry, environmental studies, palaeoenvironments, and instrumental technology. The theme of the conference will focus on the general study of the physical environment of the high southern latitudes, embracing both small and large scales in space and time, and covering the three basic regimes of ice, ocean, and atmosphere and their interactions.

Papers dealing with the observation, analysis, or modeling of any aspect of the general theme are welcome. Provisional topics for the meeting include: ocean/ice/atmosphere interaction; boundary layer processes; tropospheric processes; high atmosphere processes; general circulation and climate; and atmospheric chemistry and precipitation. The expected closing date for receipt of extended abstracts is, as of this writing, *February 1981*. Those wanting an exact deadline for receipt of abstracts, and those interested in attending the conference, should contact the conference Chairman *immediately* at: Antarctic Conference Chairman, Department of Meteorology, School of Earth Sciences, University of Melbourne, Parkville, Victoria 3052, Australia.

Cooperation between scientists in U.S. and Taiwan

Through the American Institute in Taiwan, the National Science Foundation supports collaborative scientific research between scientists in the United States and Taiwan. Although all areas of science and engineering are supported under the U.S.-Taiwan Cooperative Science program, joint advisory committees composed of U.S. and Taiwan scientists recommend that cooperative research activities be developed in certain priority areas. One of these areas, environmental problems associated with pesticide usage, may be of interest to some BULLETIN readers.

Summaries of advisory committee recommendations for future research are available to interested scientists. Additional information may be obtained from individual committee participants, listed with the recommendations, or from the program associate: Dr. Maurice Edwards, U.S.-Taiwan Cooperative Science Program, National Science Foundation, 1800 G St., N.W., Washington, D.C. 20550 (tel.: 202-357-9537).

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[1] Notice of registration deadlines for meetings, workshops, and seminars, deadlines for submittal of abstracts or papers to be presented at meetings, and deadlines for grants, proposals, awards, nominations, and fellowships must be received at least three months prior to deadline dates.—*News Ed.*

Mr. **Changnon**. Thank you. In addition to claiming that the demonstration is here and now and we don't need to continue to wrestle with that research, we think, therefore, that the intergovernmental climate program is ready for operational launching. I think the fact that we have 41 States with some degree of State climatological programs up and going is proof that the States feel reasonably convinced that those types of services are to their benefits. Frankly, it has been interesting that States that have large State programs in climate services, like Colorado, Michigan, and Illinois in this budget-crunch period which is going on in the States, as you know, have not had these programs eliminated nor decreased in any way.

Let's get on with the program, is our message. To the issue that Dr. Epstein mentioned about the financial implementation and the categorical grant difficulties of past administrations, and likely future ones, it seems to me that innovation is called for. One way is a better frontal attack on the administration with the kinds of built-in plans for sunsetting offered. I think the States will do the job if we can erect this thing over a period of a few years and get it up and illustrated.

And I also think there are ways within the Federal Government, if we are spending over $100 million on climate programs, to find a few million dollars to pour or move into this type of effort. Maybe realinement of mony in energy and agriculture should go into the provision of these services. Finally, it is our judgment that if the intergovernmental climate program is to continue, and if it is to be operational, that it might better be housed within the confines of the Environmantal Data and Information Service of NOAA, which has as its basic mission the management of data and the dissemination of climate information within NOAA.

Thank you for your attention, and we appreciate the opportunity to speak to the issue.

[The prepared statement of Mr. Changnon follows:]

American
Association
of
State Climatologists

MARCH 5, 1981

HEARINGS ON THE NATIONAL CLIMATE PROGRAM

Testimony
of

Stanley A. Changnon, Jr. Chief
Illinois State Water Survey
and President of AASC

I am the President of the American Association of State Climatologists and I appreciate the opportunity to comment on the National Climate Program.

The National Climate Program (NCP) is a very important activity and one that the Association I represent strongly believes is in the national interests. I will direct my comments largely to the Intergovernmental Climate Program (ICP), and related provision of climate products, those parts of the NCP that state climatologists believe to be of singular importance if the benefits of the national climate data collection and climate research are to be realized.

The rationale for the ICP is already well developed in the earlier extensive testimony for the NCP. I find it difficult to improve on the basic concept that the generation of climate data and research information without the ensuing dissemination of climate products to users would represent a classic failure. One must close the loop of utility and application. Indeed, Congressional awareness of the ICP's importance and ensuing concern over its implementation, resulting from the Administration's known resistance to the cost of the ICP, led to the detailed specification of the ICP in Section 6 of the NCP Act.

Now, 2 1/2 years after enactment, the requested ICP has not been launched. The delay in implementation stems largely from two factors. First, is a mixture of bureaucratic timidity, confusion, and lack of commitment by NOAA's top leadership. Secondly, is the refusal of OMB to consider this cost-sharing federal-state program. Often when the Administration does not proceed with a program authorized by Congress, one concludes the constituency being served has not been sufficiently influential to overcome the bureaucratic resistance. Important, however is the fact that one constituency group, the scientific community, is convinced that the "dissemination of existing climate data and information", was one of the highest priority activity of the NCP. Documents of the National Research Council and NACOA have supported this view and recommended rapid implementation of the climate products, services and ICP. The Priorities Panel of the Advisory Committee to NCP stated, "The Climate Program itself will not be successful unless the ICP receives active support." Why wait?

An alternative to making the federal-state climate program operational in 1979 centered around Administrative cries for more proof of the economic value of the program and a lack of knowledge about how to organize the program. In other words, someone had to demonstrate both the socio-economic and environmental benefits of the dissemination of climate data and information, and also to show how to organize, manage, and conduct federal-state programs like the ICP. Then, presumably, if all findings were positive, the implementation would, should, or could begin at some unspecified future time. Apparently, the pages and pages of testimony on the NCP were not remembered in that the ICP is seen as a critical activity of a total NCP. It is the one activity of the National effort that brings benefits to the cities, the farmers, the states, and the nation. One suspects these calls for demonstration research were basically a tactic for delaying the ICP.

Regardless, the scientific and climate service communities, after seeing a lack of action in NOAA, OMB, and OSTP, finally supported a phased-in approach to the ICP. Our Association, along with the Acadmey's Climate Board and NACOA, recommended in 1979 a phased-in approach towards a fully operational ICP in five years. But that was two years ago and nothing of substance has occurred. Further, the amount of resources spent on anything resembling the ICP was $105,000 in FY-80 on 5 small demonstration projects. The amount is unbelievably inadequate to even do meaningful demonstration projects. Funding in FY-81 is stated to be $200,000, and the $0.5 million planned in FY-83 is, of course, highly uncertain. It is certainly well below the $5 to $6 million needed for a fully operational, national ICP, and it is also a fraction of total federal spending on climate of $115 million in FY-80.

The NCPO has tried, in my judgment, but has largely been unsuccessful. Failure results from a lack of NOAA support and commitment to the NCPO. In fact, the NCPO has been too poorly funded to succeed in most of its mandated roles. The NCP is really largely defined by the programs at other agencies like those at DOE, NASA, and NSF, which are well organized and were thriving well before the NCP Act. They are organized and well funded to serve their missions. One could argue that these federal programs do not need nor utilize interagency management from NCPO, either to organize or promote the NCP, which is in excess of $100 million. What is needed at NCPO is a programmatic overview to get support for needed but ignored research, and the innovative initiation of new programs like ICP. For example, the NCPO could help encourage agencies, including NOAA, to fund key climate research problems like the need for methods to analyze the complex interactions between climate and sectors of the economy.

The implementation plan of the ICP is revealed in the 5-year National Climate Plan, finally issued nine months late last fall. The views of the AASC about the Plan appear in my November 1981 letter to Dr. Epstein, Director of the NCPO. It is attached for your information. The highlights of our views are that we found much of the climate plan and the identification of six principal thrusts to agree with our beliefs. However, although the priority of information generation and dissemination thrust was high, its budgeting was not in line. If information and dissemination is one of the six key areas, and it is presented in the Plan essentially as the top priority item, it seems ironic, if not unbelievable, that the plan calls for funding of $2.8 million in FY-80 for this activity. The $200,000 scheduled in FY-81 for the ICP represents only 0.16 percent of the total federal budget of $126.7 million. This is truly amazing priority setting! The statements of plans for the Information Services and the ICP are generally unclear, and the schedules and milestones for moving ahead are often vague and non specific. As yet, the ICP is declared not an approved program. We find this unacceptable.

In summary, I perceive the four key issues of the Information Generation and Dissemination activity of the NCP, and the ICP specifically, are as follows.

1. It has already been demonstrated widely that a well-focused federal-state climate dissemination program provides marked benefits to individuals, to states, and to the nation. For instance, see the type of examples in two recent articles from the Bulletin of the American Meteorological Society. Further climate impact research is desperately needed, but further research over the next several years to demonstrate the values of services will not markedly improve the information for decisions to proceed. We have all the qualitative and quantitative evidence, plus testimony, of value needed to prove the value of the use delivery side of the massive federal climate program.

2. The ICP is ready to become fully operational and to serve the nation. The attached document describing existing state efforts of 41 state climatologists of our Association reveals the needed effort is partially ongoing. One must also realize some major givens about the need for state centers and the readiness for the operational implementation of the ICP. First, proper dissemination of climate data and information is tied to existing, well-established information systems, structurally organized on the state scale. Second, the availability and credibility of state staff is important to users and to discernment and action on climate issues. Many

climate problems are on the state, or multi-state scales. Fourth, states like Colorado, Michigan, and Illinois which established extensive climate service programs many years ago have not reduced or cancelled their programs even in these difficult financial times. The benefits are clear. The very slow, phased-in process for ICP which is now 2 1/2 years old and planned to last another 5 or more years is unnecessary. Let's get on with the program. One group of 12 states has already submitted a 4-year plan to NCPO for full regional operations beginning in FY-82.

3. Can the ICP be financially implemented? Is the mandated federal-state categorical grants approach a key problem? Innovation seems called for, or an up front struggle against OMB resistance to ICP if it still exists. Meaningful sunsetting of federal support to states for advisory services and data management could be offered to remove OMB fears, but has not been done. Basically, we need federal incentives to get most state climate programs up to a functioning level, and then let the states do the service work. I am involved in a project that has found that to bring the 12 states in the North Central Region up to a "essential service level" would require about $640,000 per year. The 12 states are already investing $384,000 themselves. In this project we propose a program to bring all states to the essential level, and to simultaneously to have a federally-supported regional center for program monitoring; to assist in getting uniform data bases; and to address interstate climate problems like droughts and climate induced-insect outbreaks. After all, a fully implemented ICP would cost the federal government $5 to $6 million which is less than 5 percent of the current climate budget. Surely some present funds could be reallocated without to much loss to research. Funding of the ICP with the contributions of several agencies will require promotion and development by the lead agency.

4. Finally, where should the ICP be managed within the federal hierarchy? NOAA, after all of its lack of commitment to NCPO and the ICP, is still probably the only agency to have the NCPO and the ICP overview. Within NOAA, the entity that by mission and philosophy comes closest to the data and service roles of an operational ICP is the Environmental Data and Information Service (EDIS). An operational ICP should be entrusted to EDIS with a sufficient budget line and/or directive to work with other agencies having similar missions to secure the resources needed to make the program fully operational. This can be done within the next two years.

Mr. **Scheuer**. Thank you very, very much. George?

Mr. **Brown**. Gentlemen, I want to thank you all for a very good collective dissertation of status of this important initiate, and I want to explore briefly whether or not we may be able to come up with some ideas that might help us overcome some of the D-minus grades and move them all up to an A or a B, if I may.

The problem here, in my opinion, is not one resulting from a conspiracy to do in the program, or bad will on the part of any individual, it seems to be more of an endemic problem when you are seeking to innovate with new institutional structures, and I don't know how to overcome that problem. We don't have any good models, but let me mention a few situations which seem to offer some parallels and see if it can stimulate our thinking a little bit.

It has been 120 years since we recognized the encompassing need for research on agricultural problems and set up our land grant college system in the Department of Agriculture that occurred in 1862 and 1863, and it stemmed from the same kind of a concern.

Our lab was our basic national resource, that the utilization of that lab was in the hands of millions of individuals who required the aggregation of their need for research and for the application of research programs, so the land grant colleges, the extension service for the dissemination of knowledge were set up at that time, and seems to have worked fairly well over that period. Not perfectly.

We tried to follow that model with programs more recently. For example, we have shared programs in water research with the States and there is the sea grant program involving the States and programs relating to the ocean. We tried to set up an energy extension service when we set up the Energy Department as a means of disseminating and involving large numbers of people in problems of using energy more rationally and conserving our vital resource, and now we are beginning to recognize we have another all pervasive system in terms of climate impacting on all the countries of the globe, and requiring the participation at all levels, not just the Federal level.

For some reason or another we have made the wrong, or we haven't yet gotten the proper combination of institutional structures to carry that out, and I'm wondering if possibly some of the— well, I'm wondering where we can attack this problem. Is it a failure of leadership? That is, have we failed to properly get across to the leaders of our Governement the need to set this system in place and make it effective, and therefore, there is a resistance on the part of the established departments, whether we have chosen the wrong organizational site for it, for the National Climate Program Office?

A suggestion has been made that you be placed with the Environmental Data Service, and that conceivably could work better, or just where the hangup is. I don't know where to go from here at this point. Is there any agreement amongst any of this group, who are probably the best versed of any group that I can think of, of a change in the location of the Climate Program Office to higher visibility, either at NOAA or to another agency?

Could it be put in the Department of Agriculture, for example, and utilize that existing structure, the State relationships and research programs? One way we approach these problems sometimes is to put into the Executive Office of the President where there is resistance when we set up the legislation, either OSTP or OMB.

A more vigorous Member of Congress, maybe I should say, Jack Brooks, in thinking of legislation to handle some of the problems of information last year got a bill through which mandated OMB provide this coordination service in the field of information, and set up a structure which he thought would solve this coordination problem, by requiring an Assistant Secretary level person in each department to be responsible for the coordination of information flow.

Well, we are talking about an information flow problem here, actually. It is conceivable that that kind of structure could work, but I think there is uniform agreement that the present structure does not give sufficient attention, illumination, focus, on the Climate Program Office. Am I correct?

Mr. CHANGNON. That's correct.

Mr. BAUM. May I comment, Mr. Brown?

Mr. BROWN. Yes.

Dr. BAUM. I believe we are dealing with a complex problem. One of the reasons I suggested that some mechanism be created to look at the problem with a view toward amendments in 1982 is the complexity is such that it seems unlikely that it can be resolved between now and May 15.

I believe the question of the location of the Climate Office which you raised is a very important component of the problem. But with the variety of comparable programs that you have mentioned, and they are very good examples, and you know them much better than I do, I believe in each of those instances, certainly the ones that I know about, in each of those instances there is a single agency of the Government, be it Agriculture, or NOAA with sea grant, or Interior with water resources, there is a single place which has the authority and the responsibility and the funding, and in addition to the location of the Climate Office one has to look at this business about the funds being dispersed in a variety of agencies and being subject, therefore, to review within each agency where priorities vary greatly.

The Administrator of NASA, for example, is likely to take a very different perspective than the Secretary of Agriculture toward their relative parts in the national climate program.

Mr. BELSKY. Mr. Brown, if I could make a few comments as well, one of the concerns you raised that is going to increase in the future is sea grant. In the past sea grant has had the ability to fund money for appropriate programs. As I am sure you are aware, if is one of the programs that is about to be reduced under the theory that the States should undertake those programs.

As Dr. Baum has indicated, NOAA does not have the responsibility for the funding, of all the money for climate activities but. It has the responsibility for coordination. About a year ago the level of the program office was elevated, and Dr. Epstein's office is now at the level of the National Weather Service. He is at the level of the head of the Environmental Data and Information Service.

If he was to work for the head of EDIS that would result in lowering, rather than elevating of his level.

I think the problem here as far as coordination and trying new programs is not the system, necessarily. If you look at the national pollution program, a similar kind of a program, a 5-year plan which has an interagency coordination function and the interagency board, the reasons I think that that program might be more successful than this is twofold.

One, the two programs in climate, for which we see requests going through and funding being rejected are the Experimental Forecast Center and the intergovernmental climate program, special, unique programs, outside of the normal set of activities undertaken before the establishment of the program. There have been attempts, as I am sure this committee is aware, of trying to get those programs to work, but being difficult, they have not always been warmly received in Government.

The second thing, I think, is partially the fault of the Government but also the Congress in not listening to Dr. Epstein when he made the critiques of the other agencies and their climate programs, and when he said here is what should be done, and in what order.

We are now seeing that the program can work. I am a little less pessimistic than others, I think it is an experiment. It takes time for an experiment to work. The acid rain situation, which is patterned in many ways coordination—5-year plan—is also an experiment.

The whole idea of managing science research and services by means of plans and coordination and looking at budgets is a novel idea, and it has to be convincing as being effective to both NOAA, but more than that, I think to OMB and the Congress.

I think Dr. Epstein has done an extraordinary job in a short period of time to start that process, and I think you will agree with Dr. Baum and Dr. Suomi, the process has to be backed up as we go along. Money has to be allocated and funded, but it is going to be very tight times. We could describe to you the process to get the money funded, especially now for State/Federal program, for an experimental program where you are giving money to the State or to a university. It is a very strong concern of the States that that front money should go to the State with no strings atttached. That it should not be a categorical grant program for forecast centers or intergovernmental programs and I think you are going to find that we are going to need the money to fund this particular thing.

Mr. **Brown**. I am pleased to hear your statement. This is a more dificult problem even than the agricultural research and extension problem, because it is multidepartmental, and that does make it difficult. But I think that if we identify the problem correctly, if it is one of securing, we will say, the more effective cooperation of the other departments that remain involved, we may be able to work on that in some fashion or other. I'm trying at this point to identify where we need to focus our attention in order to assist in this further developnent of the system.

Dr. **Epstein**. If I could, Mr. Brown, the problem as I see it is not one of where the Office happens to sit in any particular hierarchy, it is a question of how the Office can be provided with the authority, by one means or another, that is commensurate with the responsibilities that are assigned to it for leadership in the program.

There has not been, in my view, any problem of working with the other agencies and getting the other agencies to cooperate in reasonable ways. The Department of Energy, for example, has been promoting the CO_2 program and is largely responsible for it, and they have very eagerly embraced their role within the national climate program. This you can see by the recent publication they produced, their Research Issues, which they point out is a publication through the national climate program.

What has been the problem is that there has been no authority to back up the Office's recommendations one way or the other, whether it is within NOAA, or in OMB when it deals with the other agencies' recommendations.

It occurs to me that an alternative to deal with the lack of authority for NCPO might be that the Congress, in its appropriation of funds, would consider into the judgments on the climate program that come from the National Climate Program Office. This has not happened.

Our judgments have never even been requested as part of the documentation for any of those requests.

There probably is not a single simple solution, but I think there is a very key problem that is clearly identified, and that is the question of authority that corresponds to responsibilities in the program.

Mr. **Brown**. Mr. Chairman, I would like to yield at this time to Dr. Suomi, who appears to wish to say something.

Mr. **Scheuer**. Fine. Dr. Suomi?

Dr. **Suomi**. Mr. Chairman, I will make what I think is an interesting parallel here. In the international community the infighting and squabbling is usually greater than when everybody persumably is on the same side. Nevertheless, this European Center for Mid-Range Forecasting, which I referred to and is spelled out in the printed statement, took a long while to negotiate. But now that it has been successfully negotiated they have a very precious thing which I think the Climate Office needs, and that is, they have something which I call "scientific sovereignty."

They have support from all of these different countries. Once the program of what they do is set, having been approved overall, they can proceed with it, without all the cutbacks and so on, and they are at the forefront. They are the ones who are making the very nice forecasts and these things are extended into the climate machine.

So somehow we have to develop a mechanism which would give this Office the equivalent of some programmatic or scientific sovereignty to be able to direct the system in an effective way. I thank you.

Mr. **Scheuer**. I would like to call on the chairman of our full committee, Don Fuqua.

Mr. **Fuqua**. Thank you. Mr. Chairman, I apologize for being late this morning. Unfortunately, we have more than one meeting going on at the same time. We have another one going on here in 20 minutes.

Werner, I want to thank you for coming, and I am sorry I was not here to introduce you to the committee, but I am sure that Jim did a great job and we are very pleased by the outstanding work you are doing at Florida State.

I have just one general question that I would like to ask, and again, I apologize if it has already been asked and I am repeating, what do we need to do legislatively to try to untangle the problems that we have had? Is there legislative action that we need to do?

Dr. **Baum**. If I can give you one response, Mr. Chairman, yes, but unfortunately, I am not in a positioin to tell you specifically how to amend the act. It is clear that an amendment is called for with regard to the organizational/management structure of the program, and in my formal testimony I recommended that some mechanism be created, either by the Congress or by the administration, or jointly, to look at alternatives and make recommendations for specific amendments to be considered in 1982, because it will take a period of study and negotiation and so on. Some amendment is absolutely essential if this program is really going to go.

Mr. **Fuqua**. With some study and thought could you give some more specifics to that?

Dr. **Baum**. Well, there are a variety of possible alternatives one can imagine. One alternative which was considered earlier was placing the program in OSTP. That was not acceptable to the prior administration. At the moment we don't know whether there will even be an OSTP. That is an alternative which requires some looking into.

Another possible alternative is to change funding arrangements, so that perhaps half in effect have a matching grant program within the Federal Government. Have half the resources allocated to the principal agency and half the resources allocated to the National Climate Program Office, so that the Office has some leverage, and can see that the duly established priorities are really pursued.

There are also possibilities about relocating the Office in other places. There is a spectrum of possibilities that requires a great deal of thought and negotiation. This can't possibly be done, in my opinion, between now and May 15, which I believe is your deadline for that.

Mr. **Belsky**. Mr. Chairman, there are a couple of technical changes in the short term, and I think that Dr. Suomi and I have both mentioned them, but I think one of the things we can do is to use the National Climate Program Act which now mandates that we come back with recommendations on a periodic basis.

I see nothing wrong with that. I think it is totally appropriate for the Advisory Board and the Climate Program Board, plus NOAA, to sit down and see if we can come together with some ideas on how to improve the program. The difficulty will be how to get those ideas from those working groups up through the system. I don't know what the results of that process will be, but I certainly think it is appropriate to look at that issue again and see what is hindering the process.

Again, I share Dr. Epstein's statement, I don't think it is where it is, I think it is the authority of the Office. No matter where the Office would be, if that authority is not given to it, it is going to have the same problem.

Mr. **Scheuer**. Will the chairman yield?

Mr. **FUQUA**. Sure.

Mr. **SCHEUER**. We have to get our authorization deck cleared by May 15, and we are under great pressure to do that. So willy-nilly we are going to give an authorization by May 15.

But there is no reason why the groups that you mentioned couldn't get together and try and achieve some consensus and come back to us after May 15. Don't you agree, Mr. Chairman?

Mr. **FUQUA**. I was going to suggest, Mr. Chairman, that we have to go ahead with the authorization. You are absolutely correct. We are under the gun to move, but we can still be working so that this time next year, hopefully, we can have formulated some type of policy that we can do constructive change in the organic act, and incorporate these things. I would encourage you to get these groups together.

I think you are in a much better position than we to at least make recommendations. Now, we may or may not take them all. We may have problems with the administration; we may have other problems. But at least I think it would be helpful to have the benefit of your deliberations on this.

If the chairman will yield?

Mr. **FUQUA**. Yes.

Mr. **SCHEUER**. Once we get our authorizing legislation through, and we must do that, let us say by May 15, wouldn't it be possible to then at that time, hold a day of hearings, hear their testimony? If they have achieved consensus in the next 90 days as to which organic amendmants would be appropriate to the act we could then go ahead with an amendment to the act that wouldn't involve authorizations after May 15.

Mr. **FUQUA**. True, as long as you are not authorizing money, you can change the basic act at any time, and you don't necessarily have to have the administration and others sign off on it. If we have a hearing and ask you what you have concluded, I hope you could tell us.

Mr. **BELSKY**. Are you asking for a task force to be set up and the task force to report, rather than the Government to report its position, on what amendments?

Mr. **FUQUA**. We don't want the President to veto the bill, we want to cooperate with the administration. And I think we should try to cooperate with it in every way that we can.

Dr. **BAUM**. That is an excellent plan, Mr. Chairman. There is one minor technical amendment which I mentioned in my testimony, I hope you will consider. The present act requires a 5-year plan to be submitted every 2 years. Given the present scarcity of resources, human and fiscal, and given the fact that the program has gotten off to such a slow start, if you could relax that requirement it would permit human/fiscal resources to be put to better use.

Mr. **FUQUA**. Mr. Carney.

Mr. **CARNEY**. Thank you, Mr. Chairman. It was suggested in testimony today that we try to authorize money for only 1 year, because of the difficulties that we are involved in, and that we have some type of reorganization program, after we get that 1 year's authorization passed.

I clearly think there is a dual problem, which I think is important enough to recognize it, and that is the survival of the 1-year authorization. The first problem we are faced with is we don't know what is in store on May 10. We do not if the Congress itself, if you do not receive the support from the administration, will have adequate numbers to support the program for another year.

And I agree with the chairman, Mr. Scheuer, that problem No. 2 can be solved if we can get through the first problem by simply having you come back to us. We would have to work it out after we get that May 15 deadline behind us, and try to put together whatever is necessarry to make the program more viable.

What I hear is that we have some turf problems, and also that it is always difficult to have responsibility without the authority. It is a difficult task for anyone to go through, and I think we will have to look into this. Thank you, Mr. Chairman.

Mr. **Fuqua**. Thank you very much for being here today.

Mr. **Scheuer**. I'm sure there will be some more questions. I think we have achieved a consensus that we will ask you back after May 15. We will have another hearing on nonauthorizing organic changes and we hope you will achieve a consensus.

If we can achieve a consensus, we would hope to get the consensus of the private nonprofit sector, the State group that you represent, Mr. Changnon, and the National Academy of Sciences and the National Program Advisory Committee. We hope at least there will be a consensus among the three of you, and hopefully, NOAA and the National Climate Program Office will be part of that consensus, but failing that we will have some recommendations.

We hope you will meet informally, as an informal task force, as Chairman Fuqua described it, and be prepared to come back here with recommendations after May 15.

Now, I am not going to ask any questions of you, Mr. Belsky, or you, Dr. Epstein, because I assume that we will have you back here the week after next. I will have a couple of questions for the other three members of the panel. First I would like to call on the ranking minority member, Mr. Carney, for any further questions.

Mr. **Carney**. I think that is exactly what we are going to have to do, Mr. Chairman. We are going to have to have the gentlemen, Dr. Epstein and Mr. Belsky back in the next couple of weeks for a budgetary review. Once we get past that hurdle we will all have to come back and see what we can put together.

Mr. **Scheuer**. Do you have anything further at this time?

Mr. **Carney**. No further questions at this time.

Mr. **Belsky**. If I can, I would like to have the formal testimony which was prepared, detailing all the things that the Climate Office has done, plus the attachments which indicate some of the things that Dr. Epstein mentioned, the DOE report, to be included in the record as a part of the submission to this hearing, if you have no objections.

Mr. **Scheuer**. We would appreciate that very much, and we hope that also you would address yourself to some of the friendly criticism that you have heard from the three witnesses. They are all very supportive of your work, and you have already heard the grade, the A for effort from Dr. Suomi.

We hope we can move forward to solve some of the other organizational and turf problems, as my colleague described them. We will work toward bringing the National Climate Program Office to a more effective posture of coordinating and integrating the efforts of these 15 or more agencies, handling the mandate better, which will reflect a great deal of credit on NOAA.

So I hope you will address yourself to some of the supportive suggestions and criticisms that you have heard, and see if we can't engage in some constructive problem-solving. We have a problem. There has been an enormous amount of effort expended by NOAA and other agencies, and we hope that with the best will in all the world we will all move forward together in solving these problems.

If you will address some of the specific questions that have been made, and the specific criticisms that have been raised, recognizing the supportive and friendly and cooperative environment in which they were raised, we would appreciate that very much.

Let me address one question to all of the panelists. What are the relative roles of the fossil fuel combustion and tropical deforestation in the growing increase of atmospheric carbon dioxide levels and the whole greenhouse effect which several of you have elaborated on, and which threatens global survival, as we know it?

Dr. SUOMI. Mr. Chairman, as I indicated in my testimony, the problem isn't going to go away. It is a fair consensus that if the carbon dioxide content goes up as projected some of these things will occur. There is a disagreement on the role of the ocean. It may be that the ocean absorbs more, but it may also be a sleeper. That is, it may absorb and then give up without adequate warning.

So it seems to me that it is a problem that must not be taken off the stove. I don't think today it necessarily has to be on the front burner. There is a level of activity going on that is looking into the matter. On the other hand, it certainly deserves more than the back burner, too. The difficulty is that it is so complex it involves the chemical cycles, the biological cycles, the ocean as well as the atmosphere. We are looking at the atmosphere, but the reservoirs and their rates of accumulation or depletion are simply not known. It is a highly interactive nonlinear problem and those are the most difficult kind of all.

So it will only be advanced by good basic research in finding out what is in the ocean, what is in the atmosphere, what is in the biomass, and so on, and a good program has been outlined on how to get this, but the thing that I think you should be concerned with is that it is not jeopardized. It is international in scope, too, it is very complex.

If I were to just call your attention to a statement in this week's Science on—here are some of the statements in this week's Science on page 1036, and the issue is the March 6, 1981, issue. This was the AAAS, and supported by DOE, and Roger Vale was Chairman of the Project Sting Group, and here are some of the things.

The problem is global. All countries have added carbon dioxide to the atmosphere and will be affected by its consequences. Two, the probable outcome is beyond human experience. Temperature averages will be warmer than those within the past 100,000 years.

The problem is long range. As the use of fossil fuels increases the gradual buildup of carbon dioxide in the atmosphere will continue, with effects which may not be felt for many years. The buildup of CO_x is only one aspect of the global energy situation. The buildup of atmospheric CO_2 will be affected by the mix of energy sources as well as by the rates.

The role of less developed countries will be more important in the future. International agreements will be complicated. Quantitative estimates of cost and benefits are not now possible.

There will be some benefits as well as some disbenefit. The range of probable outcomes can be estimated and increased understanding of the problem will make it possible to put together policies which will increase the benefits and decrease the cost of CO_x climate change, and the article alludes to the fact that more competent people must be involved in this important question. It is a very important question.

Mr. **Scheuer**. Well, what you are saying is at once frightening, and also hopeful, I suppose, if we use our resources to get even the present state of the art out to decisionmakers around the world. That would facilitate many improvements in the situation, and perhaps reduce some of the negative trends that are developing.

You know, we have heard in the last few months reports from the World Bank, from the year 2000 report of the State Department, from the West German Brandt Commission report that in terms of food, weather, population and whatnot the situation in the Third World in the next decade or two, by the end of the century is going to be calamitous unless we change the way we are doing business, unless basic trends are changed.

Now, here you have talked about the most threatening—I don't want to get overdramatic but changes in water supply, food production, in deforestation, which mostly will take place in the developing world, although many of its fallouts would hit us.

Do you think that the product of the National Climate Program Office and the dissemination of information and research and demonstration we are about to engage in could be used by not only ourselves, but other nations in the developed world to help developing world countries meet some of these tragic problems that have been addressed by these three reports, in terms of hunger, water, not only deforestation, desertification, and so forth, does this program hold the potential for helping us assist those nations avoiding the tragedy and the pathos that has been painted as facing them in the decades ahead?

Mr. **Changnon**. Mr. Chairman, this isn't exactly a direct answer to your rather large question, if I may say, but the question you are asking about CO_2 is within the context of the larger issue of climate change.

Mr. **Scheuer**. Indeed.

Mr. **Changnon**. And without addressing the research needs and the questions in CO_2 I would say that the State climatologists in New York, for example, are advising business and State agencies right now about the droughts, interpreting the drought in New York as we are doing in Illinois in the context of climate information that exists right now, and exists elsewhere in the world to allow developing nations to assess their weather extremes, and in that sense the interpretation and the planning that goes with that, indeed, is a product of NOAA and its entities as they extend out through the States.

Remember, a lot of climate issues are at the State and regional scale, like the current droughts in the United States, so that dissemination exists. It is not good enough, but it is there, and could be there worldwide to help.

Dr. **Epstein**. If I may, Mr. Chairman?

Mr. **Scheuer**. Yes.

Dr. **Epstein**. There is a world climate program in which the United States has been participating, and in fact, was very instrumental in establishing, that very much addresses those issues on an international scale in a way that is quite similar to the way in which the national climate program is intended to address them on a national basis. I think it is extremely important that we continue to encourage and support this international effort to deal with the full range of climate issues.

The world climate program has a structure similar to the national program. There is a research program, and there is also an impact studies program, a data program, and an applications program within the world climate program. We should be seeking ways to help support more vigorously many of these activities.

Mr. **Scheuer**. I take it, also, in terms of the domestic utilization of this knowledge, in terms of our energy shortage, that this kind of information on climate should help assist the regions, the States, and even down to the city level, to plan ahead better to meet projected shortages of both energy, water, I suppose?

Dr. **Epstein**. Right. Absolutely.

Dr. **Suomi**. Mr. Chairman, I would like to add to that, what has happened in the interim is that there has been a significant technicological change. The business of getting data through small computers, and so on, has made enormous advances. I have one in my home, and I could have one here. If there were a telephone connection, I could type in and get some of these things.

So what is needed is some unity so this can be advanced.

Mr. **Scheuer**. Well, we have another group waiting outside. It is now 1 minute to 10 and they are due to start at 10.

I want to thank all of you for some very stimulating and very thoughtful testimony. We may have some questions for NOAA, and we may have questions to ask others of you, so we will hold the record open another 10 days or 2 weeks, and with that and our thanks, this session of the Subcommittee on Natural Resources, Agriculture Research and Environment will be adjourned.

[Whereupon, at 10 a.m., the subcommittee adjourned.]

APPENDIX I—LEGISLATION

Public Law 95-367
95th Congress

An Act

To establish a comprehensive and coordinated national climate policy and program, and for other purposes.

Sept. 17, 1978
[H.R. 6669]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Climate Program Act".

National Climate Program Act.
15 USC 2901 note.

SEC. 2. FINDINGS. 15 USC 2901.

The Congress finds and declares the following:

(1) Weather and climate change affect food production, energy use, land use, water resources and other factors vital to national security and human welfare.

(2) An ability to anticipate natural and man-induced changes in climate would contribute to the soundness of policy decisions in the public and private sectors.

(3) Significant improvements in the ability to forecast climate on an intermediate and long-term basis are possible.

(4) Information regarding climate is not being fully disseminated or used, and Federal efforts have given insufficent attention to assessing and applying this information.

(5) Climate fluctuation and change occur on a global basis, and deficiencies exist in the system for monitoring global climate changes. International cooperation for the purpose of sharing the benefits and costs of a global effort to understand climate is essential.

(6) The United States lacks a well-defined and coordinated program in climate-related research, monitoring, assessment of effects, and information utilization.

SEC. 3. PURPOSE. 15 USC 2902.

It is the purpose of the Congress in this Act to establish a national climate program that will assist the Nation and the world to understand and respond to natural and man-induced climate processes and their implications.

SEC. 4. DEFINITIONS. 15 USC 2903.

As used in this Act, unless the context otherwise requires:

(1) The term "Office" means the National Climate Program Office.

(2) The term "Program" means the National Climate Program.

(3) The term "Secretary" means the Secretary of Commerce.

SEC. 5. NATIONAL CLIMATE PROGRAM. 15 USC 2904.

(a) ESTABLISHMENT.—The President shall establish a National Climate Program in accordance with the provisions, findings and purposes of this Act.

(b) DUTIES.—The President shall—

(1) promulgate the 5-year plans described in subsection (d)(9);

(2) define the roles in the Program of Federal officers, departments, and agencies, including the Departments of Agriculture, Commerce, Defense, Energy, Interior, State, and Transportation; the Environmental Protection Agency; the National Aeronautics

and Space Administration; the Council on Environmental Quality; the National Science Foundation; and the Office of Science and Technology Policy; and

(3) provide for Program coordination.

Establishment.

(c) NATIONAL CLIMATE PROGRAM OFFICE.—The Secretary shall establish within the Department of Commerce a National Climate Program Office not later than 30 days after the date of the enactment of this Act. The Office shall be the lead entity responsible for administering the Program. Each Federal officer, employee, department and agency involved in the Program shall cooperate with the Secretary in carrying out the provisions of this Act.

Administration.

(d) PROGRAM ELEMENTS.—The Program shall include, but not be limited to, the following elements:

(1) assessments of the effect of climate on the natural environment, agricultural production, energy supply and demand, land and water resources, transportation, human health and national security. Such assessments shall be conducted to the maximum extent possible by those Federal agencies having national programs in food, fiber, raw materials, energy, transportation, land and water management, and other such responsibilities, in accordance with existing laws and regulations. Where appropriate such assessments may include recommendations for action;

(2) basic and applied research to improve the understanding of climate processes, natural and man induced, and the social, economic, and political implications of climate change;

(3) methods for improving climate forecasts on a monthly, seasonal, yearly, and longer basis;

(4) global data collection, and monitoring and analysis activities to provide reliable, useful and readily available information on a continuing basis;

(5) systems for the management and active dissemination of climatological data, information and assessments, including mechanisms for consultation with current and potential users;

(6) measures for increasing international cooperation in climate research, monitoring, analysis and data dissemination;

(7) mechanisms for intergovernmental climate-related studies and services including participation by universities, the private sector and others concerned with applied research and advisory services;

(8) experimental climate forecast centers, which shall (A) be responsible for making and routinely updating experimental climate forecasts of a monthly, seasonal, annual, and longer nature, based on a variety of experimental techniques; (B) establish procedures to have forecasts reviewed and their accuracy evaluated; and (C) protect against premature reliance on such experimental forecasts; and

Five-year plan, submittal to Congress.

(9) a preliminary 5-year plan, to be submitted to the Congress for review and comment, not later than 180 days after the enactment of this Act, and a final 5-year plan to be submitted to the Congress not later than 1 year after the enactment of this Act, that shall be revised and extended biennially. Each plan shall establish the goals and priorities for the Program, including the intergovernmental program under section 6, over the subsequent 5-year period, and shall contain details regarding (A) the role of Federal agencies in the programs, (B) Federal funding required to enable the Program to achieve such goals, and (C) Program accomplish-

ments that must be achieved to ensure that Program goals are met within the time frame established by the plan.

Establishment.

(e) Advisory Committee and Interagency Groups.—(1) The Secretary shall establish and maintain an advisory committee of users and producers of climate data, information and services to advise the Secretary and the Congress on the conduct of the Program. Members of such committee shall not be employed by the Federal Government and may receive compensation at the daily rate for GS-16 of the General Schedule for each day engaged in the actual performance of their duties for the committee and while so serving away from their homes or regular place of business may be allowed travel expenses, including per diem in lieu of subsistence.

5 USC 5332 note.

(2) The Secretary shall establish and maintain such interagency groups as are necessary and appropriate to assist in carrying out responsibilities under this Act.

(f) Cooperation.—(1) The Program shall be conducted so as to encourage cooperation with, and participation in the Program by, other organizations or agencies involved in related activities. For this purpose the Secretary shall cooperate and participate with other Federal agencies, and foreign, international, and domestic organizations and agencies involved in international or domestic climate-related programs.

(2) The Secretary and the Secretary of State shall cooperate in (A) providing representation at climate-related international meetings and conferences in which the United States participates, and (B) coordinating the activities of the Program with the climate programs of other nations and international agencies and organizations, including the World Meteorological Organization, the International Council of Scientific Unions, the United Nations Environmental Program, the United Nations Educational, Scientific, and Cultural Organization, the World Health Organization, and Food and Agriculture Organization.

Annual appropriation request to OMB.

(g) Budgeting.—(1) Each Federal agency and department participating in the Program, shall prepare and submit to the Office of Management and Budget, on or before the date of submission of departmental requests for appropriations to the Office of Management and Budget, an annual request for appropriations for the Program for the subsequent fiscal year. The Office of Management and Budget shall review the request for appropriations as an integrated, coherent, multiagency request.

Horizontal budgets.

(2) Section 304 of the Act of October 18, 1962 (31 U.S.C. 25) (relating to preparation of horizontal budgets for meteorology), is amended—

(A) by inserting "and of the National Climate Program established under the National Climate Program Act" after "meteorology", and

(B) by striking out "aspects of the program" and inserting in lieu thereof "aspects of the programs".

Effective date.
31 USC 25 note.

The amendments made by the preceding sentence shall apply with respect to budgets submitted for fiscal years beginning 6 months or more after the date of the enactment of this Act.

15 USC 2905.

SEC. 6. INTERGOVERNMENTAL CLIMATE PROGRAMS.

Federal and State cooperative activities.
Grants.

(a) Establishment.—The Secretary shall establish a program for Federal and State cooperative activities in climate studies and advisory services. The Secretary is authorized to make annual grants to any State or group of States, such grants to be made available to public or private educational institutions, to State agencies and to other persons or institutions qualified to conduct climate-related studies or provide

Limitation. Restriction. climate-related services. Such grants may be made for not more than 50 percent of the costs, in any one year, of the research conducted or services provided under the grant. Federal funds received from other sources shall not be used to pay the remaining share of the cost of such research or services. The Secretary shall work with other appropriate mission agencies in conducting this program.

(b) Detail of the Intergovernmental Program.—The intergovernmental program shall provide, among others, the following State and regional services and functions:

(1) studies relating to and analyses of climatic effects on agricultural production, water resources, energy needs, and other critical sectors of the economy;

(2) atmospheric data collection and monitoring on a statewide and regional basis;

(3) advice to regional, State, and local government agencies regarding climate-related issues;

(4) information to users within the State regarding climate and climatic effects; and

(5) information to the Secretary regarding the needs of persons within the State for climate-related services, information and data.

(c) Intergovernmental Program Requirements.—Prior to making a grant to any State or group of States under this section, the Secretary shall find that—

(1) the State, or each of the States in a group, has adopted a State climate program in accordance with the provisions of this Act and rules and regulations promulgated by the Secretary; and

(2) the State, or each of the States in a group has—

(A) integrated its climate program with the Program; and

(B) established an effective mechanism for consultation and coordination with Federal and local government officials and users within the State.

The Secretary shall insure that grants made to a State or group of States under this section are made on an equitable basis.

15 USC 2906. Report to President and congressional committees.

SEC. 7. ANNUAL REPORT.

The Secretary shall prepare and submit to the President and the authorizing committees of the Congress, not later than January 30 of each year, a report on the activities conducted pursuant to this Act during the preceding fiscal year, including—

(a) a summary of the achievements of the Program during the previous fiscal year;

(b) an analysis of the progress made toward achieving the goals and objectives of the Program;

(c) a copy of the 5-year plan and any changes made in such plan;

(d) a summary of the multiagency budget request for the Program of subsection 5(g); and

(e) any recommendations for additional legislation which may be required to assist in achieving the purposes of the Act.

15 USC 2907.

SEC. 8. CONTRACT AND GRANT AUTHORITY; RECORDS AND AUDITS.

(a) Functions vested in any Federal officer or agency by this Act or under the Program may be exercised through the facilities and personnel of the agency involved or, to the extent provided or approved in advance in appropriation Acts, by other persons or entities under contracts or grant arrangements entered into by such officer or agency.

Record keeping.

(b)(1) Each person or entity to which Federal funds are made available under a contract or grant arrangement as authorized by this Act shall keep such records as the Director of the Office shall prescribe, including records which fully disclose the amount and disposition by such person or entity of such funds, the total cost of the activities for which such funds were so made available, the amount of that portion of such cost supplied from other sources, and such other records as will facilitate an effective audit.

Accessibility to records.

(2) The Director of the Office and the Comptroller General of the United States, or any of their duly authorized representatives, shall, until the expiration of 3 years after the completion of the activities (referred to in paragraph (1)) of any person or entity pursuant to any contract or grant arrangement referred to in subsection (a), have access for the purpose of audit and examination to any books, documents, papers, and records of such person or entity which, in the judgment of the Director or the Comptroller General, may be related or pertinent to such contract or grant arrangement.

SEC. 9. AUTHORIZATION FOR APPROPRIATIONS.

15 USC 2908.

(a) General Authorization of Appropriation.—In addition to any other funds otherwise authorized to be appropriated for the purpose of conducting climate-related programs, there are authorized to be appropriated to the Secretary, for the purpose of carrying out the provisions of this Act, not to exceed $50,000,000 for the fiscal year ending September 30, 1979, and not to exceed $65,000,000 for the fiscal year ending September 30, 1980.

(b) Authorization of Appropriation for Grants.—There are authorized to be appropriated to the Secretary sums not to exceed $10,000,000 for the fiscal year ending September 30, 1979, and not to exceed $10,000,000 for the fiscal year ending September 30, 1980, as may be necessary for grants under section 6 of this Act, to remain available until expended.

Approved September 17, 1978.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 95-266 (Comm. on Science and Technology) and No. 95-1489 (Comm. of Conference).
SENATE REPORT No. 95-740 (Comm. on Commerce, Science, and Transportation).
CONGRESSIONAL RECORD:
Vol. 123 (1977): Sept. 9, considered and passed House.
Vol. 124 (1978): Apr. 24, considered and passed Senate, amended.
Aug. 17, Senate agreed to conference report.
Sept. 6, House agreed to conference report.

○

Public Law 96-547
96th Congress

An Act

To amend section 9 of the National Climate Program Act to extend the authorization for appropriations for fiscal years 1981, and for other purposes.

Dec. 18, 1980
[S. 1391]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 9 of the National Climate Program Act (15 U.S.C. 2908) is amended to read as follows:

National Climate Program Act, appropriation authorization extension.

"SEC. 9. AUTHORIZATION FOR APPROPRIATIONS.

"In addition to any other funds otherwise authorized to be appropriated for the purpose of conducting climate-related programs, there are authorized to be appropriated to the Secretary, for the purpose of carrying out the provisions of this Act, not to exceed $50,000,000 for the fiscal year ending September 30, 1979, not to exceed $65,000,000 for the fiscal year ending September 30, 1980, and not to exceed $25,500,000 for the fiscal year ending September 30, 1981, of which amount not less than $2,653,000 shall be made directly available to the National Climate Program Office in the form of a budget item separate from the activities of the National Oceanic and Atmospheric Administration.".

SEC. 2. Section 6(b) of the National Weather Modification Policy Act of 1976 (15 U.S.C. 330e) is amended to read as follows: "There are authorized to be appropriated $150,000 for the fiscal year ending June 30, 1972, $200,000 each for the fiscal years 1973 through 1980, and $100,000 for the fiscal year ending September 30, 1981, to carry out the provisions of this chapter.".

Approved December 18, 1980.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 96-1392 (Comm. on Science and Technology).
SENATE REPORT No. 96-782 (Comm. on Commerce, Science, and Transportation).
CONGRESSIONAL RECORD, Vol. 126 (1980):
    Aug. 27, considered and passed Senate.
    Oct. 1, considered and passed House, amended.
    Dec. 4, Senate concurred in House amendments.

○

APPENDIX II—QUESTIONS AND ANSWERS

Questions to Dr. Edward Epstein
Hearings on the National Climate Program
March 5, 1981
Subcommittee on National Resources, Agriculture Research,
and Environment

Question 1:

One of the roles of your office is budget coordination. Whom do you talk to at OMB? Do you talk to budget examiners other than NOAA's examiner?

Answer:

The only National Climate Program Office contact at OMB has been Mr. John Dyer, budget examiner for the Commerce Department. Mr. Dyer has provided the Special Analysis of the climate program budget, which we prepare each year, to examiners for other Departments and agencies whose climate budget requests are included in the analysis.

Question 2:

Do you prepare a document that OMB may use in evaluating the budget requests for climate activities of all the Federal agencies. Would you submit a copy of this document for the record?

Answer:

The National Climate Program Act directs OMB to review agency climate budget requests as an integrated, coherent multi-agency request. NCPO, at the request of OMB, compiles and analyzes this multi-agency budget. So far, there have been four such analyses but the Special Analysis of the FY 1982 budget request was the first to be based on a Five-Year Plan. A copy of the Special Analysis is provided as you requested.

Question 3:

One of the functions of the National Office is to identify and fund studies and applications that you find to be underfunded or ignored by agencies conducting climatic studies. Mr. Belsky testified that funds have been avilable to the Office for this purpose. What funds? What are your suggestions in this regard for fiscal year 1981? For FY 1982? Who at OMB has seen these recommendations?

Answer:

The National Climate Program Office had available about $290 thousand in fiscal years 1979 and 1980 for studies and applications. These funds came partly from appropriations and partly from internally redirected resources in NOAA. We also received some funding support from NASA in fiscal year 1979. Specific activities funded by NCPO have included a workshop on climate impact assessment methodologies, a study to develop an ocean climate monitoring strategy, and research on the use of climate information to increase the efficiency of water and energy utilization through improved irrigation scheduling in the high plains, and on the experimental use of satellite remote sensing to identify and map agricultural climate zones in Florida.

In fiscal year 1981, about $90 thousand is available for such activities. We are supporting a study, for the Office of Technology Assessment, of the future role of space technology in climate, and an analysis of the requirements for surface climate data and data networks. Another study we hope to initiate involves requirements for climate information and climate constraints on the introduction of new crops in arid and semiarid regions. Such a study would be undertaken in support of cooperative U.S. - Mexico efforts to foster agricultural development and introduce new crops in the arid border region of the two countries.

OMB was last presented with a request for general support of the NCPO in the NOAA budget submission for fiscal year 1981. It was determined at that time, on the basis of negotiation between OMB and NCPO, that the limited funds that were to be allowed for the Program Office should first be directed to initiating the intergovernmental and experimental climate prediction programs.

For the fiscal year 1982 climate budget request, we have identified three areas we would recommend for greater funding support. These are climate prediction and analysis, ocean climate monitoring, and generation and dissemination of climate information. This last item would include, specifically, preparation of climate data sets by the National Climatic Center that are in high demand and additional demonstration projects of Federal/State cooperation in climate data and services. The first two recommendations were contained explicitly in the Special Analysis that NCPO prepared for OMB. The third recommendation was contained in NCPO's endorsement of NOAA's fiscal year 1982 OMB budget submission. There also continues to be a need for further studies and workshops related primarily to the Areas of Program Concern defined in the Plan.

Question 4:

What is the status of the Intergovernmental Program? When is another round of projects due to be funded?

Answer:

The Intergovernmental Program is in the early stages of its first phase. Phase I consists of a series of projects demonstrating the value of local climate services and exploring ways in which they can be delivered. Five such demonstration projects are underway. A Program Development Plan has been formulated and is currently being reviewed by state representatives. This Plan identifies the issues needing resolution in order to operate an efficient and effective program, and will be used as a guide in future project selection.

A Request for Proposals for the second round of projects will appear in the Federal Register in early April. Funded projects will commence in August. Of the $200 thousand available, approximately half will be used for new projects. The balance will be used to continue existing projects as appropriate. The status of these projects is currently being reviewed.

Question 5:

Why was the Office's Five-Year Plan so long in the preparation? It was nearly 15 months overdue.

Answer:

The first substantial delay was associated with preparation of a Preliminary Plan as required by the Act. The Preliminary Plan was submitted to Congress in July 1979, four months late. Concern was expressed by the Congress regarding inadequacies of the Preliminary Plan. The NCPO was requested not to proceed with preparation of the Final Plan until the House Environment and Natural Resources Subcommittee could hold additional Hearings. During this period, the Assistant Administrator for Policy and Planning met with ranking members of the authorizing committees of both the Houses and Senate to gain their input on improvements needed in the Plan. Additionally, a number of outside groups reviewed and critiqued the Preliminary Plan during this period.

The review process culminated on November 15, 1979 when the Subcommittee on Environment and Natural Resources held its second hearing on implementation of the Climate Act.

A draft of the final Plan was then prepared and in March, 1980, distributed for review by Federal agencies, outside reviewers, and OMB. On the basis of this review a final draft was completed in July 1980. It received prompt approval of the Climate Program Policy Board and the Secretary of Commerce and was submitted to the White House. The Plan was subsequently promulgated by the President and received by the Congress on November 15, 1980.

In summary the plan was overdue in part because of the time needed for preparation and writing (10 months for the preliminary plan and 4 months for the final plan), in part to obtain and make use of extensive reviews and assistance, and in part to obtain review and approval from the Congress and from the Executive Branch.

Question 6:

The top priorities for future program development identified in the Plan include "generation and dissemination of climate information" and "climate prediction". Yet the projected budget authority for the National Program through FY 1984 shows no increases in these areas (see page 83 of the Plan). Why not? What can your office do to encourage funding in these areas?

Answer:

The table you are referring to, on page 83 of the Plan, sums agency climate budgets included in the President's budget for fiscal year 1981. The Program category--Data, Infromation and Services--was projected to peak in fiscal year 1982 and to decline in each of the next two years. Nearly all of the projected decrease is in NASA's budget for the Earth Radiation Budget Experiment, which declines after fiscal year 1982. Budget projections beyond FY81 were based on specific agency appproved plans.

Specific plans to implement the priorities of the Climate Program are being addressed pm a year-to-year basis. Agencies have adjusted their plans in response to the priorities expressed in the 5-Year Plan. For example, in its budget request for fiscal year 1982, NOAA has requested a budget increase for climate information and data activities to support the Principal Thrust on generation and dissemination of climate information.

The Five-Year Plan is the strongest means available to the Program Office to encourage changes in agency climate activities. The Program Office encourages funding of priority activities by (1) reminding agencies of the obligation to consider high priority options for the Climate Program as they develop their budget requests, and (2) reporting to OMB on the extent to which agency budgets are responsive to Program priorities and recommending appropriate modification of budget requests when appropriate.

Question 7:

During the Carter Administration, what were the relative roles of NOAA, OMB, OSTP (Office of Science and Technology Policy in the White House), and the National Climate Program Office in determining budget priorities for the National Climate Program.

Answer:

The individual agencies' rankings of their own programs were the largest single factor in determining budget priorities for the National Climate Program. However, each agency, including NOAA, considered the priorities and alternatives contained in the Five-Year Plan and used them in determining their respective internal priority judgments. NCPO's role has been to prepare the 5-Year Plan, which expresses program priorities, and to analyze agency climate budget requests. In general the agencies' budget requests have followed the Plan. Except for adjustments made by OMB to NOAA's budget, these became the climate budget requests submitted to Congress by President Carter.

OMB's initial responses to the agenices were accompanied with caveats that they were tentative evaluations pending completion of NCPO's Special Analysis. However, no changes were made by OMB on completion of the Speical Analysis.

I do not know the full extent of OMB's consultation with OSTP in regard to the climate budget and program priorities, although such consultation certainly took place. OSTP was consulted by NCPO during the preparation of the Plan, and gave specific endorsement to its contents.

Question 8:

The National Climate Program Office is currently situated in the Office of Policy and Planning of NOAA. Is this an appropriate location for a national program office? What realistic chance does the Office have of formulating national policy when it must answer first to the NOAA Planning Office and then the NOAA Assistant Administration?

Answer:

The National Climate Program Office is located in the Office of Policy and Planning. As Director of NCPO, I report directly to the Assistant Administrator for Policy and Planning. This is comparable to the Director of the National Weather Service who reports to the Assistant Administrator for Oceanic and

Atmospheric Services.

I do not believe the effectiveness of the Office has been hindered by its specific location in NOAA. More critical to the effectiveness of NCPO as a national office are (1) its ability to make independent judgments from a national perspective and to interact directly with other agencies, with OMB, and with the non-Federal climate community, and (2) the attitude of the Administrator toward NOAA's programmatic responsibilities and toward the National Program. The Assistant Administrator has encouraged the independence of NCPO and has represented the Office and the Program very positively to the Administrator. As an example of the NCPO's ability to carry out its functions within the present structure, the Special Analyses that we have prepared for OMB have been sent directly to OMB without either review or prior approval on the part of NOAA.

Question 9:

How are the "Milestones" in the first Five-Year Climate Plan determined? Are they merely a compilation of programs requested by individual agencies or do they represent a true overview by the National Office. Illustrate your answer by reference to the Milestones established for "Generation and dissemination of climate information" on pages 22-23 of the Five-Year Plan?

Answer:

Milestones of the Five-Year Plan were determined through consultation between the lead agency for each Principal Thrust and the Program Office. The milestones are not just a compilation of programs requested by individual agencies but rather they are the product of a joint effort, including the non-governmental climate community, to assure that a national perspective is applied in setting climate program prioritie and carrying out program activities.

Milestones for the Principal Thrust, Generation and Dissemination of Climate Information, were jointly developed by the lead agency, the Environmental Data and Information Service of NOAA and the Program Office in this way: NCPO and EDIS jointly sponsored a National Climate Data Management Workshop May, 1979. Workshop participants represented both users and producers of climate data, information and services. Workshop recommendations were the basis of milestones later set for the Principal Thrust. Timing for the milestones was based on EDIS's assessment of resource requirements and availability. It should be noted that one key activity recommended by the Workshop--to produce a climate data inventory--has now been completed and was recently published by EDIS.

Questions to Dr. Werner Baum
Hearings on the National Climate Program
March 5, 1981
Subcommittee on National Resources, Agriculture Research,
and Environment

Question 1:

What strategy should the National Office follow in funding Experimental Climate Forecast Centers? Present plans call for approximately $100 K to be available to fund the Forecast Centers. Is this enough to accomplish anything? What could be accomplished with $500 K, or $1,000 K?

Answer:

The single most important point regarding the Experimental Climate Forecast Centers is to fund several (at least three) approaching the problem with differing methodologies (e.g., mathematical modelling of the atmosphere, statistical approaches, physical-synoptic techniques). Our knowledge is insufficient to work from a single hypothesis, "putting all our eggs into one basket," to use a trite expression. It might also be useful to have different approaches by economic sector (e.g., agriculture, water resources, energy), as their requirements differ. A general solution to the climate forecasting problem is not necessary to obtain an economically useful product. For example, it would be very useful to know if the coming summer will be--say, in the Midwest--among the driest 10% in our experience or among the wettest 10% in our experience; it does not really matter so much whether it is 10% above or below average.

In any case, $100 K is a totally inadequate sum. Each center, once developed to stable size, would require several times that much. The total program should be at a level of at least $1,000 K.

Question 2:

What would you recommend that the National Office include in the next revision of the Five-Year Plan that was omitted or underemphasized in the 1980 version?

Answer:

Before additions are made to the 1980 version of the Five-Year Plan, the existing Plan should be adequately implemented.

Question 3:

In your opinion, does the location of the National Office in NOAA compromise the ability of the Office to function as a truly national office?

Answer:

I believe that, ideally, the National Office should not be in any participating agency but at an independent and higher level, where it could exercise authority commensurate with its responsibility. This does not now seem practical. If it is to be in any participating agency, NOAA is the appropriate one. There is no doubt that NOAA is the focal point of climate activity in the U.S. Government. It is to be hoped that the completely new cast of characters in NOAA will give the National Office the stature and support it requires, and that the Office will receive a line appropriation.

Question 4:

Do you agree with the general priorities established in the Five-Year Plan? Do you think that the Plan went far enough in identifying specific ways in which the national effort in climate can be improved?

Answer:

I agree with the general priorities and believe that the current difficulty is not with the Plan but with failure to implement it.

Question 5:

Do you think that the "Milestones" established in the first Five-Year Plan were merely a compilation of programs requested by individual agencies, or do they represent a true overview and independent judgment by the National Office?

Answer:

In real life, of course, no such simple distinctions exist. By and large, however, I feel that the "milestones" represent real needs of the nation. In actuality, the plan was basically written by the Climate Board of the National Academy of Sciences at its 1979 Worksop in Woods Hole. That is where the ideas were crystallized and the priorities developed. Both the individual agencies and the National Office capitalized on the product of that Workshop.

Question 6:

Does your Advisory Group have adequate input to the National Office?

Answer:

Our Advisory Group has limited input to the National Office, as a group. Being dependent on the National Office for all staff support and travel funds, we are a "captive." The situation is aggravated by the constraints imposed by the laws and regulations covering government advisory committees in general. It is my personal opinion that the nation would be better served by asking the Academy--with due representation of user groups--through its Climate Board to exercise the necessary and desirable advisory functions.

We have formed a "task force" in response to your request at the March 5 hearing. The group will have a meeting in Washington on April 3 and 4. Some of the above points will be addressed as we seek to reach a consensus and report back to you as soon as practical after May 15.

Questions to Dr. Verner Suomi
Hearings on the National Climate Program
March 5, 1981
Subcommittee on National Resources, Agriculture Research,
and Environment

Question 1:

What strategy should the National Office follow in funding Experimental Climate Forecast Centers? Present plans call for approximately $100 K to be available to fund the Forecast Centers. Is this enough to accomplish anything? What could be accomplished with $500 K, or $1,000 K?

Answer:

The National Climate Program Office (NCPO) should fund additional Experimental Climate Forecast Centers. There should certainly be more than one and less than five. Moreover, the approach of each of these centers should be different from the others. If the NCPO could work cooperatively with other agencies, it is likely that some support could come from the other agencies. Initially, the funding must be greater than $100 K but probably not more than $500 K, and it need not come from only the NCPO, as I have already maintained.

Question 2:

What would you recommend that the National Office include in the next revision of the Five-Year Plan that was omitted or underemphasized in the 1980 version?

Answer:

An important topic not included in the present plan is water and drought. This is an extremely important topic for our society right now, and it will progressively get worse. This serious omission should be removed. The next plan also needs a specific implementation plan as to how the provisions in the Law will be met, when, and by whom.

Question 3:

In your opinion, does the location of the National Office in NOAA compromise the ability of the Office to function as a truly national office?

Answer:

The location of the NCPO in the National Oceanic and Atmospheric Administration (NOAA) did compromise the ability of the office to function effectively in the past. The reason was not primarily the location but the lack of support by the past administration and the Secretary of Commerce. The NCPO must have the backing of the President and the Secretary of Commerce. This is mandatory, and the Law places that burden on the President. With this backing and a capable person who can work with the agencies, the program could continue in NOAA. It would help if the level of the Director of the NCPO were higher within NOAA. It is really people and commitment and not geography.

Question 4:

Do you agree with the general priorities established in the Five-Year Plan? Do you think that the Plan went far enough in identifying specific ways in which the national effort in climate can be improved?

Answer:

I do agree with the general priorities. However, the priorities are essentially the old ones of the agencies placed under an umbrella along the lines of the academy reports. No integration of present efforts surfaced, and no new priorities were set, nor was there an implementation plan, no specifics on how the climate centers would be implemented were given. The same goes for the intergovernmental program which should be set up with goals and schedules. There is no look ahead for the next ten years, what is really missing are some new ideas. The plan should be continually updated. A five-year plan should not be frozen for five years.

Question 5:

Do you think that the "Milestones" established in the first Five-Year Plan were merely a compilation of programs requested by individual agencies, or do they represent a true overview and independent judgment by the National Office?

Answer:

The milestones in the five-year plan are mainly agency milestones. They were merely compiled by NCPO. The milestones are essentially agency ones.

Question 6:

What are the mechanisms for maintaining cooperation between the U.S. climate effort and the World Climate Research Program? Is the cooperation adequate to insure that the resources of the U.S. Climate Program are effectively utilized -- i.e., that we build upon international advances in climate and that we avoid duplicative efforts.

Answer:

An adequate mechanism exists, and an effective office could handle it. The Global Atmospheric Research Program (GARP) example worked extremely well, and we are now reaping very great benefits. The GARP example is one to follow.

Question 7:

What can be done to improve the use and usefulness of climate information to planners and policymakers?

Answer:

There is an urgent need to create interfaces with the agencies. So far, they have not even been explored. There needs to be agreement on the "sprinkling of holy water," at the top agency levels, then things will run well at the working level. A simple letter from the top goes a long, long way. These interfaces work both ways - up and down. These probably are different interfaces, but they must be in place. The best gadget will not work if it is not plugged in. No message gets through a disconnected phone.

Question 8:

What is being done internationally in the area of improved climatic forecasts? Is progress being made in forecasting climate with physical models, as opposed to forecasting with statistics and correlation?

Answer:

Some good work is being done internationally on relatively short ranges from which we could benefit immediately. The European Center for Medium-Range Weather Forecasts is producing excellent numerical forecasts in the one-week range, and I understand that the British Meteorological Office produces both valuable physical and statistically-based forecasts on monthly and seasonal scales. I understand, but am not fully familiar that other countries with numerical modelling activity are also making contributions. Improvements in the forecasting capabilities of all nations can come from coordinated multinational observing and research programs, because climate pays no attention to national boundaries. The World Climate Research Program, supported by the world's scientists through International Council of Scientific Unions (ICSU) and the world's governments through the World Meteorological Organization (WMO), is designated to tackle this problem; it merits our strongest support.

Questions to Mr. Stanley A. Changnon
Hearings on the National Climate Program
March 5, 1981
Subcommittee on National Resources, Agriculture Research,
and Environment

Question 1:

What strategy should the National Office follow in funding Experimental Climate Forecast Centers? Present plans call for approximately $100 K to be available to fund the Forecast Centers. Is this enough to accomplish anything? What could be accomplished with $500 K, or $1,000 K?

Answer:

Along with the Intergovernmental Climate Program, the AASC believes that the development of climate forecasts are of extremely high value to the states and our nation. Hence a high priority should be set. Useful capabilities are beginning to be developed, largely of a statistical nature. Due to the importance of the climate forecasts, and their developmental nature, the traditional approach of funding several different approaches seems wise. Thus 3 or 4 centers (based on whatever a "center" is), should be funded. Total funding at $100,000 a year level is ridiculously small. Meaningful statistical research on climate forecasts being pursued at my organization in Illinois over the last four years has averaged $150,000 per year. Funding for a meaningful research and development of several techniques would dictate annual funding of $750,000 to $1 million.

Question 2:

What would you recommend that the National Office include in the next revision of the Five-Year Plan that was omitted or underemphasized in the 1980 version?

Answer:

Our Association has addressed the contents of the 5-year Plan in considerable detail. As noted in my testimony, we agree with the scope of the material in the Plan. What we disagreed with strongly was the lack of specificity in the implementation of the Intergovernmental Climate Program and Experimental Forecast Centers, and the levels of budgeting for these two efforts and the data generation and dissemination effort. That general area oriented to immediate needs and users are the major problems in the 5-year Plan.

Question 3:

In your opinion, does the location of the National Office in NOAA compromise the ability of the Office to function as a truly national office?

Answer:

The question of location of the National Climate office in NOAA, is really a part of a larger institutional question of "how to make the National Climate

Program function". In my judgment, the National Climate Program Office is more apt to function adequately: 1) if it has a position giving it a stronger overview over the budgets of the other climate involved agencies; and 2) if it is structured "higher" within NOAA, possibly answering directly to the Administrator. If such a position within NOAA cannot be achieved through legislation, then one should consider the placement of the National Office in the National Science Foundation.

I view the institutional position of the Intergovernmental Climate Program as a potentially separate issue. We perceive that this program should be divorced from the National Climate Program Office. One can consider the installation, with line item funding of the Intergovernmental Climate Program, in the Environmental Data and Information Services branch of NOAA. Also, because of its close state advisory services function, and the many applications to agricultural interests and their well established extension network of user services, one could also argue that the USDA could be a meaningful home for the Intergovernmental Climate Program activity.

Question 4:

Do you agree with the general priorities established in the Five-Year Plan? Do you think that the Plan went far enough in identifying specific ways in which the national effort in climate can be improved?

Answer:

The Association agrees with the general priorities established in the 5-year Plan. However, the Plan, as I mentioned above, did not go far enough in its specification of the ways in which the national effort could be implemented or improved. Implementation of several activities including the interstate program was vague.

Question 5:

Do you think that the "Milestones" established in the first Five-Year Plan were merely a compilation of programs requested by individual agencies, or do they represent a true overview and independent judgment by the National Office?

Answer:

As I noted in my testimony before the Subcommittee on 5 March, I perceive that much of the "National Program" is but an assemblage of programs, generally good, that the mission-oriented federal agencies would be doing anyway without a "national" program. Hence, since NCPO has little power to influence the budgets of these agencies, the programs of the agencies, including their milestones, are agency views and the Plan is not a "true overview".

Question 6:

Is the National Program losing its credibility with the States due to the slow implementation of the Intergovernmental Program?

Answer:

In my judgment, the National Climate Program, through its poor handling of the Intergovernmental Climate Program, has lost most, if not all of its credibility with the states. For example, the Governor of Illinois wrote to the Secretary of Commerce in 1980 complaining about the fruitless activities that Illinois had pursued to "get ready" for the ICP at the request of NOAA, and secondly about the total lack of federal action on the ICP. Other governors have also indicated their displeasure. State climate centers have been created in 28 states in response to the program, and state climate plans developed without any following action on the federal part. However, the credibility problem is probably more related to NCPO and NOAA's credibility, as opposed to the credibility of the National Climate Program.

APPENDIX III

Additional Material for the Record

SPECIAL ANALYSIS

UNITED STATES CLIMATE PROGRAM

PLEASE NOTE:

Circular A-10, "Budgetary material should not be disclosed in any form prior to transmittal by the President of the material to which it pertains. The head of each agency is responsible for preventing premature disclosures of this budgetary information."

Part I - Introduction

This is the fourth special analysis of agency budget requests to support the National Climate Program. This, however, is the first analysis to be based upon an approved Five-Year Plan. The Five-Year Plan (dated September, 1980, in press, but unchanged from the July 1980 draft) establishes the goals and priorities for the Program, Federal agency roles in the programs, Federal funding required to enable the Program to achieve such goals, and Program milestones that must be achieved to ensure that Program goals are met within the time frame established by the Plan. Sections 5.d.(9) of the National Climate Program Act describes requirements for the Five Year Plan; Section 5.g. of the Act requires that each agency submit a separate request for appropriations and that the Office of Management and Budget (OMB) shall review the request as an integrated, coherent, multiagency request. This analysis is intended to aid OMB in that task. The aim here is to compile, review and evaluate agency budget requests on the basis of the Five Year Plan.

The Five Year Plan follows the strategy of emphasizing the provision of useful climate products based on existing capability while simultaneously increasing our understanding of climate and our ability to respond to impacts and policy implications of climate. Within these three activity areas, the Plan lays out six Principal Thrusts. These thrusts aggregate high priority activities; and each thrust is assigned a lead agency as shown in the table.

Activity Category	Principal Thrust	Lead Agency
I. PROVIDING CLIMATE PRODUCTS	Generation & Dissemination of Climate Information	NOAA
	Climate Prediction	NOAA
II. RESPONDING TO IMPACTS AND POLICY IMPLICATIONS OF CLIMATE	Carbon Dioxide, Environment and Society	DOE
	Climate and World Food Production	USDA
III. UNDERSTANDING CLIMATE	Solar and Earth Radiation	NASA
	Ocean Heat Transport and Storage	NSF

In addition to these Principal Thrusts, there are continuing program activities (monitoring, modelling studies, etc.) which, though not explicitly parts of the thrusts, provide the bases of a comprehensive, integrated Program.

To get a full view of the Program, it is also necessary to analyze the budget data along the lines of the continuing program elements. The continuing program elements are:

1. Impact Assessment
2. Climate System Research
3. Observations and Monitoring
4. Data Management
5. Diagnosis and Projection
6. Information Services
7. National Program Management

This analysis is composed of three parts: a compilation of the budget request (per OMB circular A-11 and NCPO Memoranda); an evaluation of the data in terms of the Five-Year Plan and the needs for an integrated Program, and an evaluation of agency initiatives to be considered in the FY 1982 budget decision process.

Part II - Budget Compilation

A. Overall Tables

The agency budget summary (Table 1) projects a growth in Climate Program resources to $163.0M for FY 1982 compared to 144.4M for FY 1981. The largest increases are those planned for NASA's approved Earth Radiation Budget Experiment and increased effort in DOE on research and assessments of the CO_2 issue. The other notable increase is in NOAA and will support a variety of activities including experimental climate forecasts, expanded State-Federal cooperative studies and provision of more timely access to high-demand climate data. The projected decline in total requirements beyond FY82 is largely due to reduced requirements as the Earth Radiation Budget satellite system development nears completion for its planned 1984 launch.

Table 2 presents a cross-walk which characterizes the size of agency FY82 effort in each of the program areas.

B. Impact Assessment (Table 3)

The largest efforts in Impact Assessment are in the Department of Agriculture and Energy. The Agriculture program seeks to quantify relationships between climate and agricultural production through such techniques as crop yield model development. Also included are some elements of the program for Agriculture and Resources Inventory Through Aerospace Remote Sensing (AGRISTARS). The Department of Energy Program aims to assess the societal and economic consequences of a build-up in atmospheric CO_2. This includes quantifying the environmental changes that might result from CO_2 induced climate change. DOE also has identified significant activities related to the impact of climate on Energy Production, Distribution and Demand, an Area of Program Concern in the Five-Year Plan. The small increase in Agriculture is due to the identification of additional on-going work as being related to climate and small increases spread over the bureaus. Of the DOE increase, close to $3M is for expanded efforts on determining the societal consequences of a build-up in atmospheric carbon dioxide (CO_2) and possible ameliorative strategies. These efforts are directed toward a "1984 Interim Assessment Report," a major milestone of the CO_2 program as laid out in the Climate Program Five Year Plan and the National CO_2 Program Plan.

The work in Commerce largely deals with relating climatic elements to fishery yields and applying climate data in energy demand modelling. The Interior effort is in applying climate data in water resources management. NSF supports research in climate impact assessment.

C. Climate System Research (Table 4)

The National Science Foundation supports a large and diverse program of climate research overseen in several NSF research divisions. Most of the research is conducted at academic institutions, but $6.0M of the total ($26.5M) supports climate research at the National Center for Atmospheric Research (NCAR). Of the NSF program, over $4M is for research associated with the carbon cycle and climatic consequences of increasing atmospheric CO_2. NSF also manages $2.6M transferred from DOE for support to joint CO_2 projects.

The DOE research effort is mainly focused on the CO_2 problem: predicting future CO_2 concentration including the roles of the oceans and biosphere; estimating effects of increased CO_2 levels on the global climate; quantifying environmental changes that may result from climate change. The non-CO_2 research supported by DOE is aimed at climate prediction techniques most useful to energy supply management and fuel distribution.

The Commerce research budget supports the work at the Geophysical Fluid Dynamics Laboratory (GFDL) in climate modelling, simulation and associated studies. The NASA effort consists of climate modelling and range of special studies (e.g. air-sea interactions, stratospheric aerosols) set forth in the NASA plan entitled NASA Contributions to the National Climate Program. The Interior program consists of paleoclimatic studies conducted by USGS and research related to climatic effects on precipitation enhancement in the Water and Power Resources Service.

D. Observations (Table 5)

These are generally monitoring programs intended to yield long-term data as opposed to short term field measurements made to observe specific processes as part of a research program. For instance, the largest FY82 effort will be NASA's program ($32.9M) of which the bulk of resources ($24.0M) will go toward the Earth Radiation Budget Experiment (ERBE). It is envisioned that radiation budget measurements will likely need to be made over a double solar activity cycle (approximately 22 years). FY82 is the year of peak ERBE satellite development funding; beyond FY82 funding will decline toward a 1984 planned launch. NASA is developing the technology and NOAA will likely oversee the long term measurement effort. Solar and Earth Radiation is a Principal Thrust of the Climate Program Five-Year Plan.

The second largest observations program is in NSF, where the total figure, $8.2M, contains $6.7M of ship, facility, and logistic support for the NSF academic fleet.

The largest factor in the Commerce request is the NOAA program Geophysical Monitoring for Climatic Change (GMCC) which measures and tracks baseline atmospheric composition, radiation, and other parameters. The total also includes $0.9M for marine monitoring developmental effort proposed to start in FY81 but for which appropriations have not yet been approved by Congress. The networks of Cooperative Climatic Observers and the Reference Climatological Stations are also included but represent a very small part of the costs. About $0.8M is included for earth radiation budget measurements from existing operational satellites.

The Department of Energy operates the world's only high altitude sampling program on a regular basis. The Department of Agriculture monitors snow pack and snow conditions to forecast water supply for irrigation purposes in the western states.

E. Data Management (Table 6)

The Department of Commerce (NOAA) has overall civil sector responsibility to provide general climatic information. Thus, Commerce (NOAA) has lead agency responsibility for the principal thrust on the Generation and Dissemination of Climate Information. Much of the budget shown is for general archival activities at the National Climatic Center (NCC) in Asheville, North Carolina which stores a wide range of global surface, upper air, and satellite data. In particular, NCC stores for climatic purposes the data collected and analyzed for NOAA's operational weather forecasts. NCC also has access to much data collected by the Department of Defense and other agencies.

An increase of $2.0M over 1981 is included to implement key features of the Climate Program Five Year Plan in improving user access to quality controlled high-demand data sets. Temperature, winds, precipitation, marine weather, and solar radiation are the most frequently used data sets and have been assigned highest priority. The increase will be used to develop complete inventories of these data sets, fill in gaps and correct any errors, and structure the data sets in a data base management system to provide for rapid, inexpensive access by a wide variety of users. This activity is directly responsive to recommendations of the NRC Climate Research Board 1979 Summer Workshop.

The Department of Interior Water and Power Resources Services has developed and maintains a precipitation climatology in connection with its precipitation enhancement activity, Project Hiplex.

NASA and NSF manage data generally in connection with their research projects to serve their research communities. The data are available but serve a less general audience. However, NASA is developing a Pilot Climate Data Base Management System which should contribute to NOAA climate data inventory and referral efforts. NASA and NOAA are mutually well aware of each other's activities and are formulating specific coordination steps.

F. Diagnosis and Projection (Table 7)

Of the funds shown for the Department of Commerce $2.2M are for operation of the Climate Analysis Center (CAC). A part of the National Weather Service, the

CAC, inter alia: publishes monthly and seasonal outlooks for temperature and precipitation over the U.S.; participates in preparation of the Weekly Weather and Crop Bulletins; and conducts diagnostic studies of climate anomalies. The CAC exercises lead responsibility in the Climate Prediction Principal Thrust.

The remainder of the Commerce funds are for the initiation successively in FY81 and FY82 of the first two Experimental Climate Forecast Centers. The establishment of Experimental Climate Forecast Centers (ECFC) is expressly required by the National Climate Program Act. Because of its novel nature and keen external interest, the ECFC activity is being directed from the National Climate Program Office for the present. The funds for FY 1981 were part of the President's budget but are still subject to final Congressional appropriation action.

The Department of Agriculture provides up to seasonal projections of water resources availability on the basis of snow pack measurements, weather and climate conditions and historical experience. The NSF supports climate diagnostic studies.

G. Information Services (Table 8)

Information Services are a close adjunct to data management, yet here we refer more to the delivery of information in its most useful form and the steps needed to do that -- including maintaining interface communication with current and potential users. The Commerce effort, largely at NCC, stems from its overall civil sector responsibility for providing general climate information. Agriculture funds are to cover its share of producing the Weekly Weather and Crop Bulletin (with NOAA) and to provide irrigation and other water resources information regarding its snow-melt observations and projections.

The Department of Defense requires extensive climate information services to conduct its world wide defense mission under the variety of global climate conditions. These information services involve: estimation of terrain conditions for field operations; the design of clothing, buildings and equipment; advisories for aircraft and ship operations; and much more. Because of the critical nature of these requirements, the DOD operates its own climate information activities (principally the U.S. Air Force Environmental Technical Applications Center/USAFETAC, and the Fleet Numerical Oceanographic Center). There is, however, close cooperation with the Department of Commerce.

H. National Program Management (Table 9)

The National Climate Program Office was established in the Department of Commerce (pursuant to PL 95-367) to be the lead entity for administering the National Program. Through FY 1981, the funds shown are mainly for operation of the Office and conduct of a few limited demonstration activities. The increase for FY 1982 of $0.5M will support an expansion of studies to explore and demonstrate modes of Federal-State cooperation in the development and delivery of climate information. It is likely that some of these efforts will contribute directly to information services, but as the projects are selected to be experimental rather than operational, this is still considered a Program Management function. Nevertheless, it is an essential component of the principal thrust on Generation and Dissemination of Climate Information.

Part III - Evaluation

The discussion below is given in terms of the Principal Thrusts, because it is in those terms that options for program development are discussed in the Plan. Particular reference should be made to Tables 10 and 11. The allocation of Climate Program resources among activity categoreis (Impact Assessment, Climate System Research, etc.) is altered as a consequence of the exercise of various priority options; but it has not been our design to establish any particular allocation among these descriptive categories.

Tables 10 and 11 summarize the resources devoted to the Principal Thrusts. The asterisks in Table 10 denote lead agency contributions. In most cases, the lead agencies contribute the bulk of resources for eact thrust. However, part of their planning leadership responsibility is to work with participating agencies to identify high priority program needs and the efforts in the agencies which can fill those needs. The lead agencies have a great deal more work to do in this regard. For instance, NASA's work to develop a pilot climate data base management system will aid NOAA's efforts in the Generation and Dissemination Thrust, however, funding for the work is not shown yet in the tables. Similarly, the table shows no NOAA contribution to the Ocean Heat Transport thrust associated with NOAA's support of EPOCS which, though primarily a study of large-scale air-sea interaction, does contribute to understanding ocean heat-flux and storage.

It is of some interest to note the varying involvement of the Agencies in the Principal Thrusts. The DOD climate activities are all oriented toward specific defense missions and also many bear upon program priority activities, none are specifically ascribed to them. The Department of Agriculture, on the other hand is able to associate all of its climate program with Principal Thrusts. The important basic activities which assure the long-term vitality of the Climate Program consist largely of climate system research, in which NCF quite properly plays the largest role. (Compare the last columns of Tables 10 and 11.)

Generation and Dissemination of Climate Information

There are two initiatives in the Department of Commerce/NOAA submission that would implement specific activities foreseen as options in the Five-Year Plan for this principal thrust. These are (1) the proposal for EDIS to establish a Basic Users Climatological Data Base to make more readily accessible to users the information content of the National Climatic Center's (NCC) vast array of archived data, and (2) the needed expansion in the National Climate Program Office (NCPO) of the pilot and design studies for Federal/State cooperative programs in climate data and services. These were the most important activities among the options for program development in this principal thrust. These initiatives respond to a frequently expressed need to improve the usefulness and use of climate information, and implement key features of the Climate Act. Along with climate prediction these options were given the highest priority of all.

Among the remaining options which were to be considered for this principal thrust for FY 1982 were: the preparation and production of selected statistical climatological information and summaries, and the development of tailored products for particular applications. Though these were of less urgency, NOAA should examine these requirements further and ascertain to what extent they met with current resources, or what additional efforts will be required in future years.

The total funds available for Phase I of the Intergovernmental Climate Program would become about $700 thousand in FY 1982 (assuming favorable action by Congress on the President's request for appropriations for FY 1981). This funding level is expected to provide, beginning in 1983, answers to the questions that now surround the future of the Intergovernmental Climate Program. At the same time as the answers to institutional issues will be emerging, there will also be significant benefits to local and regional users of climate information. There is strong support for this activity (e.g. from the National Academy of Sciences and the statutory Climate Program Advisory Committee) as essential to the balance and effectiveness of the National Program.

Climate Prediction

There is one specific initiative for climate prediction among NOAA's proposed new activities. This would provide NCPO with $350K for experimental climate prediction. With the FY 81 base that is expected to be approved by Congress, this would provide funding sufficient to support two experimental climate forecast centers. Proposals to establish the first experimental center have been received and evaluated by NCPO; the proposals reinforce the earlier assertion that there are enough interested, prestigious institutions and different viable approaches worthy of testing that several such centers will eventually be warranted. Two such centers, starting in FY 1982, will provide a very effective test of the concept; a single center would not.

Included in the Plan regarding this thrust are options for NOAA to expand CAC efforts in climate diagnostics and to accelerate improvements in its operational predictions. The DOC chose not to request the additional support for the Climate Analysis Center (CAC). This is particularly unfortunate from the National Climate Program perspective at this time, since the DOD has recently made a decision to discontinue its modest long range forecasting activity in USAFETAC. The DOD decision was based on the conclusion, with which we agree, that climate prediction has, at present, very limited skill. However, this action has the impact of reducing the national effort to improve that skill (since the DOD activity, like NOAA's, was strongly developmental) at a time when there is wide recognition of emerging opportunities.

From the NCPO perspective, the FY 1982 budget proposal for prediction falls short of our expectations for one of the two highest priority program options.

Carbon Dioxide, Environment and Society

The Five-Year Plan, placing high priority on the CO_2 principal thrust, anticipated a substantial increase for DOE in FY 1982 for this activity. Indeed DOE has requested an increase that would bring FY 1982 budget authority for their CO_2 program to over $7 million for impact studies and to about $8.2 million for climate system research. These are in addition to smaller but still significant continuing efforts in NOAA, NSF, and USDA.

It had been specified in the Plan that the principal incremental programmatic requirements for CO_2 would be in impact assessment. Thus the DOE request is consistent with the Plan. We will express some reservations, below, not about the importance, nature or direction of the CO_2 effort, but about the relative weight being given to this principal thrust as compared to other areas of priority.

Climate and World Food Production

The requests submitted for the principal thrusts in Climate and World Food Production come entirely from the Departments of Agriculture and Commerce. The DOC/NOAA request includes $750K for continuing climate-fisheries impact studies. This item was not explicitly included last year in their climate submission, but it represents a significant continuing effort of which NCPO was aware. It is an activity clearly identified in the Plan.

The leader in this Principal Thrust is the Department of Agriculture. Their budget request identifies no major variances from FY 82. There is no reference to the options pertaining to climate aspects on livestock production, that were detailed in the Plan. Unfortunately the NCPO does not have sufficient information to judge whether plans exist to accomplish some of these options through minor reallocation of resources, or whether the continuing activities will require all the funds requested. Events of recent times, (as for example in China, Africa and the U.S.) have continued to highlight the importance of this Principal Thrust. It is deemed important to maintain the momentum established over the last several years.

Earth and Solar Radiation

The Earth and Solar Radiation principal thrust is proceeding in fine fashion as far as the Earth Radiation Budget Experiment is concerned.. NASA, as lead agency and major contributor to this effort, has included a budget request designed to accomplish the basic program goals according to the schedule given in the Plan. However, the NOAA submission understates NOAA's contribution to this principal thrust, although no incremental funding is requested. The Climate Dynamics Program of the Special Research Programs Office is supporting (along with NSF and NASA) important analyses of cloud data, based on the FGGE data sets, that will contribute importantly to this principal thrust.

While the NASA submission contains funding for several studies outlined among the Plan's options for this thrust, neither NASA nor NOAA have requested funds to study the long term follow-on for ERBE. Attention should be given to this question in FY 83.

Ocean Heat Flux and Storage

A full assessment of this Principal Thrust is difficult at this time because of the uncertainties associated with the final FY 81 appropriation for Department of Commerce. The continuing NSF programs form a strong base for this thrust, but support for NOAA's Ocean Heat Flux Experiment and related development of observational capabilities is also crucial. There are no significant new initiatives being sought for this Principal Thrust in FY 1982. Yet the well-being of this thrust depends heavily on pursuing NOAA's planned research and ocean measurements programs.

There are two developments worthy of note with regard to the activities contributing to Ocean Heat Transport and Storage. First, the NSF has defined much more clearly now than they were able to one year ago, the nature of their continuing major ocean science projects. A year ago it was feared that these projects might take a direction that would not be as supportive of Climate Program objectives as had been earlier efforts. In fact, however, the PEQUOD and SEQUAL programs are very relevant to this Principal Thrust. Largely for this reason NSF contributions to climate system research in FY 1980 (and 1981) have been revised upward from earlier estimates and the total research effort is broader and in better shape than had been feared.

On the other hand there is still no stability to the funding for essential long term in situ ocean monitoring, even (and especially) the very cost effective programs that employ ships-of-opportunity and relatively simple tide gages on island stations. Such monitoring programs are initiated in association with research endeavors, but NSF, as an appropriate matter of policy, does not accept responsibility for continuing observational programs over many years to establish a climate record. (Observations and the standardization of observations of atmospheric CO_2 were treated similarly.) NOAA considers funding these programs, but has not accepted as sufficiently high priority the responsibility to maintain an ocean climate record, and these programs fail in the internal ZBB competition.

From the perspective of the National Climate Program these two specific activities and other long term monitoring of ocean climate indices are very important and should be supported. Apparently only the NCPO, institutionally, recognizes the priority, but only NCPO adopts the particular perspective of climate. NCPO would not operate such monitoring program but if NCPO were to have sufficient funds ($0.7M) it would assure continuation of these programs.

Areas of Program Concern

Information is not available to permit a comprehensive review of all Areas of Program Concern; two areas, however, warrant specific attention. They are Stratospheric Processes and Energy Production, Distribution, and Demand.

Stratospheric processes affect several key areas of the Climate Program. In addition to questions concerning depletion of the ozone layer, stratospheric aerosols and trace gases affect the earth's radiation balance and stratospheric temperatures may provide early warning of a CO_2 buildup in the atmosphere. Thus an understanding of stratospheric processes and dynamics is very important to the National Climate Program.

NASA's proposed Upper Atmospheric Research Satellites program is expected to provide important contributions to our understanding of stratospheric processes. This program is a continuation of the NIMBUS series and aims to provide a sound basis for a long term monitoring program. The satellite system will attempt to measure, simultaneously, all of the catalytic reactions and will observe global natural variability and energetics.

The Five Year Plan notes the need for continuing sensor development and for long term measurement. This program supports both of those objectives and should be supported.

Regarding Energy Production, Distribution, and Demand (another Area of Program Concern), some modest and very welcome increase in non-CO_2 impact assessment activities is occurring -- not so much as a specific request for this purpose, but because of broader recognition throughout DOE of the significance of climate impact studies.

Conclusion

The requests of the agencies for budget authority for FY 1982 follow the 5-Year Plan quite well. Continuation of support for National Climate Program objectives is explicit in all requests. In the Plan, NCPO identified the options related to the Principal Thrusts in Generation and Dissemination of Climate Information and in Climate Prediction as of highest priority. Next came CO_2, Environment and Society. The total increase requested is less than 13%. If one exludes the scheduled increase required for the Earth Radiation Budget Experiment, then the remaining increase, near 10%, is almost wholly associated with the very highest priority options of the Program's Principal Thrusts.

The NCPO would recommend certain adjustments to the agency requests, consistent with the Plan.

1. Developmental efforts and climate diagnostic activities in the Climate Analysis Center of NOAA warrant more support, especially in light of the decreased activity of DOD in this area. The total increase requested for the Prediction principal thrusts ($350K for experimental climate forecasting) is insufficient in consideration of the modest effort currently going into this area, its high priority in the Plan, and the emphasis it is given in the National Climate Program Act.

The CAC request that had been considered by DOC was for $1.7 million. At least half of that incremented effort should be supported.

2. Measures must be taken to assure continuation of essential long term monitoring of selected ocean climate indices. To ignore this issue is to accept the demise of necessary on-going activity while introducing new options. Funds made available to the NCPO could be allocated specifically to this purpose to assure other efforts necessary to the Climate Program and not of sufficiently high priority in any one agency.

Based on requests made within NOAA for these monitoring efforts, $0.5 million is required for the tide program, and $0.2 million to meet NOAA's commitment to the ships-of-opportunity program.

3. The overall balance of the National Climate Program is of concern. There are numerous measures of that balance implicit within the Tables. Many of the allocations are judgemental. The NCPO has questioned, and occasionally altered some of the allocations submitted by the agencies. But these differences are small in selection to the entire Program and would not influence our overall assessment.

a. Principal Thrusts vs. Total Program

The Principal Thrusts account for about 60% of the entire program. The remainder, which is primarily Climate System Research and secondly Observations, supports the Areas of Program Concern and the more basic scientific underpinnings of the Program. It seems to us that the ratio is a healthy one.

b. Division Among Activity Categories

There have been criticisms leveled at the Program in Congress because of the apparent relative weakness in Information Services compared to the large resources going into research and observations. The tabulation that indicates no change in information services from previous years is somewhat misleading. Much of the information services provided to the nation are carried out through State offices and through the private sector. The incremental efforts planned in Data Management are designed to assist information service possibilities. Also some of the funding allocated to Program Management is directed to identify means of providing improved information services. But these caveats aside, it remains true that the level of Federal effort in information services (except in the Department of Defense) is small in view of the benefits to productivity and efficient resource utilization that the nation could realize if climate information were more widely used. It is important to complete the Phase I studies of Federal-State Cooperative activities at an early date so that the proper program balance in this regard can be defined and achieved.

c. Division Among the Principal Thrusts

The most generously funded Principal Thrusts, in FY82 as in FY81, would be, if Agency requests are approved, Solar and Earth Radiation, followed by CO_2, Environment and Society. The Radiation Principal Thrust is planned to peak in FY82 and decrease sharply thereafter. The dominance of this activity within the Program is thus a temporary manifestation of the costly nature of a vital satellite experiment.

CO_2, Environment and Society will remain the dominant Principal Thrust at least through the present planning period. The Plan recognizes this and suggested that the most costly options might indeed be associated with the CO_2 program. But the Plan also identified smaller options of the Principal Thrusts related to Providing Climate Products as being of higher priority. The increases requested for Generation and Dissemination of Climate Information are smaller than those requested for CO_2, but the ratio is close to that indicated in the Plan. On the other hand the increase requested for Climate Prediction is negligible (much less than 1/10) compared to that for CO_2, and belies the relative priority assigned to it. The budget request should be adjusted, as suggested in (1) above to achieve a better Program balance. The funding implied by the requests is not an optimal balance for the National Climate Program as a whole, but only a small adjustment is needed to rectify the situation.

TABLE 1 - FY 1982 AGENCY BUDGET SUMMARY

(Budget Authority, $M)

	1980 ESTIMATED	1980 ACTUAL	1981	1982	1983	1984	1985
USDA	17.1	17.3	17.0	17.6	17.6	17.6	17.6
DOC (NOAA)	21.8	18.2	24.6	28.2	28.2	28.2	28.2
DOD	8.7	9.1	10.2	12.4	13.2	14.4	16.4
DOE	7.7 (1)	10.0	13.9	20.4	29.4	31.4	37.1
DOI	5.4	6.1	6.7	6.5	5.1	3.2	2.2
NASA	27.7	24.0	32.7	39.2	23.1	15.7	13.3
NSF	26.8	45.1	39.3	38.7	38.9	39.2	39.2
TOTALS	115.3	121.8	144.4	163.0	155.5	149.6	154.1

(1) Includes only DOE Office of Environment for FY 1980 Estimated

TABLE 2 FY 1982 AGENCY-PROGRAM SUMMARY
(Budget Authority $M)

Program Area	USDA	DOC (NOAA)	DEFENSE	ENERGY	INTERIOR	NASA*	NSF	TOTALS
IMPACT ASSESSMENT	13.3	1.5	0.4	9.8	1.0		1.00	27.0
CLIMATE SYSTEM RESEARCH		7.2	4.3	8.6	1.8	4.50	26.50	52.9
OBSERVATION AND MONITORING	1.4	5.1		1.90		32.9	8.20	49.5
DATA MANAGEMENT	0.5	8.4	0.7	0.1	3.7	1.80	1.80	17.0
DIAGNOSIS AND PROJECTION	1.4	2.7					1.20	5.3
INFORMATION SERVICES	1.0	2.00	7.0					10.0
NATIONAL PROGRAM MANAGEMENT		1.3						1.3
TOTALS	17.6	28.2	12.4	20.4	6.5	39.2	38.7	163.0

(1) Includes FY81 Ocean Heat Flux initiative. Also includes 0.9 of GFDL CO_2 modeling studies assigned by NOAA to observations

(2) Includes FY81 Ocean Measurement initiative, but excludes 0.9 GFDL research

Table 3 Impact Assessment
Budget Authority ($M)

	1980 ACTUAL	1981 ESTIMATED	1982 PLAN	1983	1984	1985
Agriculture	12.5	12.7	13.3	13.3	13.3	13.3
Commerce (NOAA)	0.8	0.8	1.5	1.5	1.5	1.5
Defense	0.4	0.3	0.4	0.3	0.4	0.5
Energy	2.9	5.1	9.8	13.4	14.8	16.1
Interior	0.5	0.7	1.0	1.5	0.8	0.4
NASA						
NSF	0.6	0.8	1.0	1.0	1.0	1.0
Totals	17.7	20.4	27.0*	31.0	31.8	32.8

*Note: The Environmental Protection Agency (EPA) supports $200K of Impact Assessment studies. EPA is, however, not included in the analysis or the OMB Circular A-11 excludes agency programs which total less than $500K.

TABLE 4 Climate System Research
Budget Authority ($M)

	1980 Actual	1981 Est.	1982 Plan	1983	1984	1985
Agriculture						
Commerce (NOAA)	5.7	5.7	7.2	7.2	7.2	7.2
Defense	2.1	2.6	4.3	4.9	5.6	7.1
Energy	5.1	7.0	8.6	13.9	14.2	18.3
Interior	2.2	2.4	1.8	1.0	0.9	0.9
NASA	3.0	3.0	4.5	4.5	4.5	4.5
NSF	22.8	25.0	26.5	26.5	26.5	26.5
Totals	40.9	45.7	52.9	58.0	58.9	64.5

TABLE 5 Observations and Monitoring

(Budget Authority ($M)

	1980 ACTUAL	1981 ESTIMATES	1982 PLAN	1983	1984	1984
Agriculture	1.6	1.4	1.4	1.4	1.4	1.4
Commerce (NOAA)	1.6	5.0	5.1	5.1	5.1	5.1
Defense						
Energy	2.0	1.8	1.9	2.1	2.3	2.5
Interior						
NASA	19.5	28.2	32.9	17.6	9.2	7.0
NSF	10.2	10.7	8.2	8.2	8.5	8.5
TOTALS	34.9	47.1	49.5	34.4	26.5	24.5

6. Data Management
Budget Authority ($M)

	1980 Actual	1981 Estimated	1982 Plan	1983	1984	1985
AGRICULTURE	0.5	0.5	0.5	0.5	0.5	0.5
COMMERCE (NOAA)	5.8	6.4	8.4	8.4	8.4	8.4
DEFENSE	0.7	0.7	0.7	0.7	0.7	0.8
ENERGY	-	0.1	0.1	0.1	0.1	0.1
INTERIOR	3.4	3.6	3.7	2.7	1.6	1.0
NASA	1.5	1.5	1.8	1.8	1.8	1.8
NSF	1.6	.16	1.8	1.8	1.8	1.8
TOTALS	13.5	14.4	17.0	16.0	14.9	14.3

TABLE 7 DIAGNOSIS AND PREDICTION
Budget Authority ($M)

	1980 Actual	1981 Estimated	1982 Plan	1983	1984	1985
AGRICULTURE	1.6	1.4	1.4	1.4	1.4	1.4
COMMERCE (NOAA)	1.8	2.4	2.7	2.7	2.7	2.7
DEFENSE						
ENERGY						
INTERIOR						
NASA						
NSF	1.1	1.2	1.2	1.4	1.4	1.5
TOTALS	4.5	5.0	5.3	5.5	5.5	5.6

TABLE 8 INFORMATION SERVICES
Budget Authority ($M)

	1980 Actual	1981 Estimated	1982 Plan	1983	1984	1985
AGRICULTURE	1.0	1.0	1.0	1.0	1.0	1.0
COMMERCE (NOAA)	2.0	2.0	2.0	2.0	2.0	2.0
DEFENSE	6.0	6.6	7.0	7.3	7.7	8.1
ENERGY						
INTERIOR						
NASA						
NSF						
TOTALS	9.0	9.6	10.0	10.3	10.7	11.1

TABLE 9 NATIONAL PROGRAM MANAGEMENT
Budget Authority ($M)

	1980 Actual	1981 Estimated	1982 Plan	1983	1984	1985
AGRICULTURE						
COMMERCE (NOAA)	0.5	0.8	1.3	1.3	1.3	1.3
DEFENSE						
ENERGY						
INTERIOR						
NASA						
NSF						
TOTALS	0.5	0.8	1.3	1.3	1.3	1.3

TABLE 10 PRINCIPAL THRUST - AGENCY SUMMARY
FY 1982 BUDGET AUTHORITY ($,M)

	GEN. & DISS. OF CLIMATE INFO	CLIMATE PREDICTION	CO_2, ENVIRON. AND SOCIETY	CLIMATE & WORLD FOOD	SOLAR & EARTH RADIATION	OCEAN HEAT TRANS & STORAGE	ON-GOING PROGRAM
USDA	3.5		1.0	13.1*			
DOC (NOAA)	11.1*	2.7*	2.5	0.8	0.8	2.4	7.9
DOD							12.4
DOE	0.1	0.2	15.5*		0.8		3.8
DOI							6.5
NASA			0.2		28.1*		10.9
NSF		1.4	6.4	0.3	1.7	4.0*	24.9
TOTALS	14.7	4.3	25.6	14.2	31.4	6.4	66.4

FY82 Budget for Principal Thrusts is 96.6 out of a total Budget of 163.0

TABLE 11 PRINCIPAL THRUST PROGRAM SUMMARY
FY 1982 Budget Authority ($M)

	GEN. & DISS. CLIMATE INFO	CLIMATE PREDICTION	CO_2, ENVIR AND SOCIETY	CLIMATE & WORLD FOOD	SOLAR & EARTH RADIATION	OCEAN HEAT TRANS. & STOR.	ON-GOING PROGRAM
IMPACT ASSESSMENT			8.2	13.1	0.8		4.9
CLIMATE SYSTEM RESEARCH		.4	13.7	0.3	2.0	2.5	34.0
OBSERVATION & MONITORING	1.4		3.7		26.1	3.9	14.4
DATA MANAGEMENT	9.0				2.5		5.5
DIAGNOSIS AND PROJECTION	1.4	3.9					0
INFO SERVICES	2.2			0.8			7.0
NATIONAL PROGRAM MANAGEMENT	0.7						0.6
TOTALS	14.7	4.3	25.6	14.2	31.4	6.4	66.4

Total Resources in Thrusts 96.6M out of 163M

OVERSIGHT OF THE NATIONAL CLIMATE PROGRAM

TUESDAY, MARCH 16, 1982.

House of Representatives, Committee on Science and Technology, Subcommittee on Natural Resources, Agriculture Research and Environment,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2 p.m., in room 2325, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Mr. Scheuer. This session of the Subcommittee on Natural Resources, Agriculture Research and Environment will come to order.

Today we will receive testimony on H.R. 5401, the National Climate Program Amendments of 1982.

The National Climate Program Act became law in 1978. The program was designed to foster greater use of climate information both by Federal, State, and local governments and by private users concerned with production and distribution of food, energy, water, and other resources.

At a time when wise husbanding of our natural resources is so important, I am convinced that use of climate data may be extremely cost effective in planning food production, in distribution of resources, and in designing human activities in general to be more resilient and more responsive to many climatic contingencies.

In addition to enhancing usage of climate data, the program addresses a number of global concerns, including the carbon dioxide-induced "greenhouse effect," which will be the subject of a subcommittee hearing on March 25.

Let me briefly recount the events that led to the introduction of H.R. 5401.

During hearings held by this subcommittee last year on the fiscal year 1982 reauthorization of the national climate program, concerns were raised whether the existing Climate Office was fulfilling its role as the coordinator of this Nation's climate program.

At that time, Chairman Don Fuqua and I asked the witnesses at the hearing to set up an ad hoc advisory group to prepare recommendations for the subcommittee on ways to increase the effectiveness of the program.

The suggestions of these witnesses and those of the committees with whom they met, which were the National Academy of Sciences, the National Association of State Climatologists, the National Program Advisory Committee, have provided our staff with guidance for the legislative changes suggested in H.R. 5401.

I feel strongly that the provisions of H.R. 5401 will enhance our national climate effort. Both my colleague from New York, Congressman Carney and I look forward to hearing the comments of our distinguished witnesses on this legislation.

Before we begin, I would like to extend a special thanks to the Climate Program Advisory Committee, the American Association of State Climatologists, the National Academy of Sciences, and NOAA for all the time and effort that they contributed in their deliberations on the climate program.

I would now like to call on our colleague from New York, Bill Carney, the distinguished ranking minority Member, for any comments.

Mr. CARNEY. Thank you, Mr. Chairman.

I would like to join you in welcoming our distinguished witnesses here today. As you have already pointed out, the contributions of these witnesses and those committees with whom they met have been incorporated in the legislative changes suggested in H.R. 5401, the National Climate Program Amendments of 1982.

I was encouraged to read the suggestions that came from the ad hoc meeting held last April, prompted by this subcommittee's hearing of March 1981. It obviously resulted in a productive exchange.

It became readily apparent at the March 1981 hearing that the national climate program needed improvements in leadership, management, and coordination. I am optimistic that the recently appointed Director of the National Climate Program Office will provide the necessary leadership and enhance the effectiveness of the program.

The amendments in H.R. 5401 are also intended to enhance the effectiveness of the program. We are here today to receive comments from Government officials and the Chairman of the National Climate Program Advisory Committee as to whether these amendments will achieve that goal.

There is one section of the bill about which I am particularly concerned. This is section 9. Authorization of appropriations, which calls for $3 million for each of fiscal years 1983 and 1984. This represents an increase of $1.9 million over the fiscal year 1983 Presidential request.

While I support the reauthorization of the act, I am concerned about this level of funding at a time when the taxpayers are calling for a reduction in Federal spending and at a time when our national deficit is rising.

I am hopeful that this subcommittee will reexamine the funds necessary to insure a productive national climate program.

I thank you, Mr. Chairman, for this opportunity to provide my comments.

Mr. SCHEUER. Thank you.

Mr. CARNEY. Dr. Baum is from a school that is near and dear to my heart. I spent some time attending Florida State university, and it is always a pleasure to have someone from that great University appear before this committee as a witness.

I sometimes wonder how come they have so many distinguished people go to Florida State and come before this committee, but I don't question it.

I am glad that you are here again, and it is a pleasure to meet you for a second time.

STATEMENT OF DR. WERNER BAUM, DEAN, COLLEGE OF ARTS & SCIENCES, FLORIDA STATE UNIVERSITY, AND CHAIRMAN, NATIONAL CLIMATE PROGRAM ADVISORY COMMITTEE

Dr. **Baum**. Thank you. We are proud of the fact that our educational qualities are such as to lead to membership in the U.S. House of Representatives.

Mr. **Scheuer**. On both sides of that table, I might add.

Mr. **Carney**. I would make a correction on that.

The distinguished Chairman of this committee is not an alumnus of that great university, but his interests lie there.

Mr. **Scheuer**. Dr. Baum is Chairman of the National Climate Program Advisory Committee and serves as Dean of the College of Arts and Sciences of Florida State University, a university that continues to produce superb contributors to the body politic.

Mr. **Carney**. I thank you, Mr. Chairman.

Mr. **Scheuer**. All right.

Dr. Baum, your statement will be printed in full in the record, so why don't you take 8 or 10 minutes to hit the highlights with us informally. I am sure we will have some questions for you.

Dr. **Baum**. You have recounted how we have gotten to this point. The nongovernmental witness were Stanley A. Changnon, then president of the American Association of State Climatologists, Verner Suomi, chairman of the Climate Board, and I.

The reason I am representing the entire group today is that at the request of my two colleagues, I took the lead in organizing an effort to meet the charge you and Mr. Fuqua gave us. An informal ad hoc meeting of some members of our three groups, representative of many of the agencies participating in the program, and congressional staff members was held in early April.

At this meeting, the principal issues were identified and a number of options were formulated. A discussion paper based on the meeting was widely distributed among the interested nongovernmental and governmental groups.

Then there was a meeting of members of the statutory advisory committee, the Climate Board, and officers of the Association of State Climatologists. Again, representatives of the National Climate Program Office, of NOAA, of many agencies participating in the program, and staff members from both Houses of Congress took part.

We were also fortunate to have the participation of the new NOAA Administrator and the OMB officer responsible for the oversight of the program. Throughout this deliberative process, the National Climate Program Office, NOAA, and the other Government agencies were uniformly cooperative, supportive, and consistently constructive.

It is important for the record to show that the discussions you generated by your charge to us have been very useful to the national climate program. Even had the amendments now before you not been developed, the program would have been enhanced by the deliberations.

The major conclusions we drew from the process just described have been incorporated in the proposed amendments. We recommend their enactment.

Establishment of the Interagency Climate Program Policy Board, we hope, will foster management of the national climate program as a coherent whole. It is our expectation that this Board will take very seriously the program and budget review functions with which it would be vested.

The amendments give the National Climate Program Office a clearly defined role in the planning, implementation, and management of the program. It would have a consequential role in the budget process and, if adequate appropriations are forthcoming, it would be able to fund high-priority activities not being pursued by participating agencies.

I have just learned that the administration, meaning OMB, has decided within the last very few days to oppose the provision in the amendments which would make it possible for the National Climate Program Office to fund high priority activities not being pursued by participating agencies.

I hope you will enact the amendments as they now stand, and will not follow the advice of the administration with regard to this specific point.

We believe that the so-called gap funding as we have referred to it in our discussions is an absolutely essential element of the National Climate Program Office's ability to discharge its overall functions and to make certain that the program is comprehensive, coherent.

It is inevitable that there will be instances of particular problems which need to be addressed which will overlap the interest of specific agencies and by any one agency might not be considered of high priority but which from a total and national picture are indeed a priority.

Finally, in the amendments, the character of the intergovernmental climate program is clarified and the matching fund grant provisions would be removed, while the objectives of this program are preserved.

Again, I have just learned that the administration will oppose the proposed revision of the wording, part of the wording at least, regarding the intergovernmental climate program, and I urge you to enact the amendments as they are now before you.

We believe it is terribly important that the executive branch have clear congressional guidance as to what the important components of the intergovernmental program are and, second, and I must now speak personally because I have just heard of this reason for objecting to the provisions, apparently the administration believes that if the activities which are enumerated in the amendments are of such importance to the States, then these functions should be funded at the State level.

I believe that while the new federalism has distinct merits, it represents somewhat of a misunderstanding of the objectives of the intergovernmental climate program and of the nature of climate to suggest that those functions should be funded at the State level.

Well, in essence, we hope that you will adopt the amendments in the form in which they are now before you.

These changes in the National Climate Program Act, we believe to be sufficient to promise a more effective program over the years immediately ahead.

Speaking personally now, Mr. Chairman, Mr. Carney, let me emphasize what we all know.

A statute such as this only creates possibilities. It assures nothing.

Among the necessary ingredients for success are adequate funding and dedicated and supportive personnel.

Financial resources will clearly be a problem in the near term. One can only hope that the executive branch and the other concerned units of the Congress will join you in perceiving the potential for enhanced national productivity which is inherent in the national climate program.

Developments on the personnel front are most encouraging. The new Administrator of NOAA understands the scientific and economic role of climate, deems the program a high priority matter and has stated to me his intention of having the National Climate Program Office report directly to his office, a consequential point to those of us who participated in the review leading to the current amendments.

Also, we will have a new Director of the National Climate Program Office. I am not sure he knows exactly what the situation is. I don't. The individual who has been appointed or is being appointed or will be appointed is one who enjoys wide respect and confidence among those of us external to the Government but close to the scene.

The combination of an amended act and new leadership holds every promise for an invigorated and more effective program if reasonable funding is forthcoming.

I would be pleased to answer any questions you might have, gentlemen.

[The prepared statement of Dr. Baum follows:]

Testimony on H. R. 5401, the "National Climate Program Amendments of 1982," before the Subcommittee on Natural Resources, Agriculture Research and Environment, Committee on Science and Technology, February 18, 1982

Werner A. Baum, Ph.D.
Dean, College of Arts and Sciences, Florida State University
Chancellor Emeritus, University of Wisconsin-Milwaukee
Chairman, National Climate Program Advisory Committee

Mr. Chairman:

You no doubt recall the hearing last March 5 on reauthorization of the National Climate Program Act. The non-governmental witnesses were Stanley A. Changnon, then President of the American Association of State Climatologists, Verner E. Suomi, Chairman of the Climate Board of the National Academy of Sciences-National Research Council, and I. We all expressed some degree of dissatisfaction with the implementation of the Program, while recognizing that much had been achieved. You and Representative Fuqua thereupon requested us to consult with our groups and to reach a consensus regarding changes in the Act that would strengthen the effort. You also expressed the hope that the Executive Branch would share in this consensus.

At the request of my two colleagues, I took the lead in organizing an effort to meet the charge you and Mr. Fuqua gave us. An informal ad hoc meeting of some members of our three groups, representative of many of the agencies participating in the Program, and Congressional staff members was held in early April. At this meeting, the principal issues were identified and a number of options were formulated. A discussion paper based on the meeting was widely distributed among the interested non-governmental and governmental groups.

Then there was a meeting of members of the statutory Advisory Committee, the Climate Board, and officers of the Association of State Climatologists. Again, representatives of the National Climate Program Office, of NOAA, of many agencies participating in the Program, and staff members from both Houses of Congress took part. We were also fortunate to have the participation of the new NOAA Administrator and the OMB officer responsible for the oversight of the Program. Throughout this deliberative process, the National Climate Program Office, NOAA, and the other government agencies were uniformly cooperative, supportive, and consistently constructive.

The discussions you generated by your charge to us have been very useful to the National Climate Program. Even had the Amendments now before you not been developed, the Program would have been enhanced by the deliberations.

The major conclusions we drew from the process just described have been incorporated in the proposed Amendments. We recommend their enactment.

Establishment of the interagency Climate Program Policy Board, we hope, will foster management of the National Climate Program as a coherent whole. It is our expectation that this Board will take very seriously the program and budget review functions with which it would be vested.

The Amendments give the National Climate Program Office a clearly defined role in the planning, implementation and management of the Program. It would have a consequential role in the budget process and, if adequate appropriations are forthcoming, it would be able to fund high-priority activities not being pursued by participating agencies.

Finally, the character of the Intergovernmental Climate Program is clarified and the matching-fund grant provision would be removed while the objectives of this Program are preserved.

These changes in the National Climate Program Act, we believe to be sufficient to promise a more effective Program over the years immediately ahead.

Speaking personally now, Mr. Chairman, let me emphasize what we all know: a statute such as this only creates possibilities; it assures nothing. Among the necessary ingredients for success are adequate funding and dedicated and supportive personnel.

Financial resources will clearly be a problem in the near term. One can only hope that the Executive Branch and the other concerned units of the Congress will join you in perceiving the potential for enhanced national productivity which is inherent in the National Climate Program.

Developments on the personnel front are most encouraging. The new Administrator of NOAA understands the scientific and economic role of climate, deems the Program a high priority matter, and has stated his intention of having the National Climate Program Office report directly to his office--a consequential point to those of us who participated in the review leading to the current Amendments. Also, we are about to have a new Director of the NCPO. The individual reportedly to be appointed is one who enjoys wide respect and confidence among those of us external to the government but close to the scene.

The combination of an amended Act and new leadership holds every promise for an invigorated and more effective Program if reasonable funding is forthcoming.

Mr. Chairman, I would be pleased to answer any questions you might have.

Mr. **Scheuer**. Congressman Carney.

Mr. **Carney**. Dr. Baum, we hear much more could be done by utilizing existing climatic data and information.

What can be done to improve the use and for that matter the usefulness of climatic information in planning and policy measures?

Dr. **Baum**. There is now a great wealth of knowledge which is not being adequately applied. I am not certain as to whether it is a failure on the part of our profession to sell the potential, or whether it is a failure on the part of business and industry to realize a potential that agriculture has seen to a greater extent over the years or a combination of those things. I suspect it is a combination.

Let me give you a very mundane but interesting example of the kinds of things one could do with what we now know about climatic conditions, that as far as I know has never been tried.

Let's talk about designing the baseball schedule. It turns out that rainfall climatically varies by hour of the day and the variation by hour of the day is somewhat different from season to season and place to place. Rainfall is not uniformly distributed throughout the 24-hour period. There are certain circumstances where it is heavier in the afternoon, and others where it is heavier or more likely in the evening.

I could optimize the American League baseball schedule for you, if you so wished, in any way that you cared to optimize it.

Suppose you wanted to have a maximum of rain-outs in the early part of the season because it would be desirable to have a maximum of doubleheaders in the latter part of the season. Or you might wish to design it in such a way so as to have a minimum number of rain-outs all season long.

I could save a lot of energy probably. People wouldn't have to drive needlessly to the ball park over the course of the season. You set up the criteria, say that you want to maximum or minimize the number of canceled ball games and I will design you a schedule as to evening or afternoon ball games that will produce that desired result over a few seasons.

Now, that may seem like a trivial example, and I use it because it is one that everybody tends to understand. That same principle can be applied in a vast number of operations in commerce and industry, and in sum total would have significant impact on the productivity of this country, and those are things we could do now.

Somehow or other, we have created a climate in which all the major business firms believe they need economists to tell them what to do, and they will pay good money to get a forecast of interest rates which is at least as questionable as the application of any climatic forecast, but American industry and commerce simply has not incorporated climate into its planning, and I think that is an unfortunate situation which we ought to do what we can to correct.

Mr. **Carney**. I would think the insurance company that insures the rained out dates for the Atlanta Braves would be interested in that information.

I will ask you not to answer this now but provide it for me later, to select a date that I can have my senior citizen picnic in August of this year and perhaps you might want to address the problem of the St. Patrick's Day Parade tomorrow.

On a serious vein, are we having a problem of getting the types of information that you are capable of providing to people out to those people, and if we are, does the National Climate Program Office have a role to play in getting that information out in a clearer, more concise, and timely manner?

Dr. BAUM. It certainly does and the National Climate Program Office has a responsiblity to be some kind of a broker, let's say, between the original data it gathers and stores, and the users. This would be an important part of the intergovernmental climate program.

A lot of brokerage is required between the vast storehouse of data, most of which is in Asheville, N.C., and the user community out there.

This is one of the functions we see for that office, to see that the appropriate mechanisms exist for dissemination of data and information.

Mr. CARNEY. My final question, Mr. Chairman, and perhaps it has nothing to do with the bill, but it would help me in my better understanding of this.

Is part of the problem that you are faced with not only one of a bureaucratic nature but one of a misunderstanding of people involved in the everyday meteorologist who gives you the daily weather service broadcast?

Is there a fogginess in there even where business and industry does not appreciate the difference?

Dr. BAUM. I think there is, Mr. Carney.

Business and industry, at least the movers in business and industry, are aware of the weather forecast and what it means to them personally, and in some instances, if they are pouring cement, what it means to their business. The same level of awareness has not been reached with regard to long-term planning with use of climatological data.

There is a big gap there, and obviously one of the major objectives of the national climate program should be to fill that gap.

One of the big disappointments to many of us has been, that the Department of Commerce, has taken zero interest in the national climate program. There is one of the potentially great applications, and the Commerce Department must have a role to play in the wedding between the availability of the information and the application of the information in American commerce and industry.

Mr. CARNEY. I thank you very much.

I think you do have a very difficult task in front of you in many industries and it is something that certainly should be pursued.

I thank you for coming up from Florida and providing us with your testimony.

Mr. SCHEUER. Dr. Baum, how much funding do you think would be needed by the National Climate Program Office to fulfill its mandated mission, including that of gap financing or bridge financing?

Dr. BAUM. I am not prepared to give you a specific number in response to that, but I would say this.

The current level of funding is inadequate. We have been able to support one forecast center, and that in a marginal type of way, and it was the intent of the Congress originally that there should be two or three or four of those experimental centers. The intergovernment climate program has been woefully underfunded. The gap money clearly should be on the order of $1 million a year, but I think the number which is in the authorization bill is not far from reality.

Mr. **Scheuer**. Is it under what you should have, or about right or is it a little more than you need?

Give us whatever help you can in quantifying your need, as well as you can, remembering that we are operating in a society that is butting its head against the real limits of the ability to do anything. We know we can do anything but we can't do everything.

What do you need to perform your essential mission and do it well?

Dr. **Baum**. For the immediate foreseeable future, the figures we are talking about are approximately correct.

I don't think they are too large. I don't think they are too small for——

Mr. **Scheuer**. You don't really feel there is a lot of fat in there? We are trying to fund programs on a tight, lean basis.

Dr. **Baum**. Of course, and as a taxpayer, I fully support that point of view.

We are dealing here with a case of investments to improve the welfare of the economy. We are talking about an investment really, not an expenditure, if you can make that distinction.

For the next couple of years, figures of this order of magnitude would be acceptable, and I think hold a potential for a significant payback.

Mr. **Scheuer**. All right. Now, on an organizational level, Dr. Baum, as you know, the administration is proposing to abolish the Advisory Committee. They are suggesting that its responsibilities could easily be met by the Climate Board of the National Academy of Sciences.

Do you agree with this? Further, since you serve as Chairman of the National Climate Program Advisory Committee, what would you say its accomplishments have been?

How often does it meet and what are its products and do you think it ought to be maintained?

Dr. **Baum**. Let me answer the second part first.

I am ashamed of the record of the committee, but I believe that reflects both the dormant period the program has been in for so many months now, due to personnel changes, and the financial problems.

I think the committee has not been used to maximum advantage by any means. I believe it has been of some help to the program but not nearly as much as it might have been, had it been used effectively and enthusiastically.

There is a feeling in some quarters of the administration at least that the committee should be abolished, and the function should be assumed by the Climate Board of the Academy.

In commenting I have to distinguish between my personal opinions and those of the community at large.

Personally, I feel that the Climate Board of the Academy could probably satisfactorily discharge the function. However, that point of view is not shared either by the majority of members of my own committee or by the State Association of Climatologists, who are afraid that the user community, which is an important part of our committee, would not be adequately represented through the Academy mechanism.

There is widespread feeling that the committee should be continued, and I believe that is the reason that the amendments would continue the committee, and I believe that this is the desirable thing to do, provided that the committee is used advantageously by the policy board and the National Climate Program Office.

It can play a various consequential role.

Mr. **Scheuer**. Mrs. Schneider.

Mrs. **Schneider**. No questions.

Thank you, Mr. Chairman.

Mr. **Carney**. I have no further questions, Mr. Chairman.

Mr. **Scheuer**. Thank you very, very much for your fine testimony.

If you would like to, can you stay up there for the next panel?

Mr. Martin Belsky, Office of Policy and Planning, National Oceanic and Atmospheric Administration, accompanied by Alan Hecht, Director, National Climate Program Office, Mr. J. Dawson Ahalt, Deputy Assistant Secretary for Economics, Department of Agriculture; Mr. Norton D. Strommen, Chief Meteorologist, World Agricultural Outlook Board, and Dr. David W. McClintock, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State.

Dr. Hecht is accompanying Mr. Belsky, right?

Mr. **Belsky**. Yes, sir.

Mr. **Scheuer**. I will ask each of you to summarize your testimony in about 5 or 6 minutes.

Your full prepared statement will be printed in the record, all of your prepared statements. They will not be lost to posterity.

We are running a little bit late, and we want to ask you some questions.

Please limit your remarks and we will have some questions for you afterwards.

I will call on Mr. Martin Belsky of the Office of Policy and Planning of the National Oceanic and Atmospheric Administration.

STATEMENT OF MARTIN BELSKY, ASSISTANT ADMINISTRATOR FOR POLICY AND PLANNING, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ACCOMPANIED BY ALAN HECHT, DIRECTOR, NATIONAL CLIMATE PROGRAM OFFICE

Mr. **Belsky**. Thank you.

As you may remember over a year ago you asked Government representatives and private organizations to get together and draft a set of amendments to the National Climate Program Act. It is these that we are considering today.

I know I have 6 minutes, but since I brought Alan Hecht with me, I will take 3 and give him 3, if you have no objection to that.

Before I go into a statement of the specifics of the administration's position on H.R. 5401, I want to say generally that the administration does support the proposed changes in the bill.

We have some few problems with a few of the sections but not with the overall concept and we also have a problem with the $3 million authorization level as compared to the $1.1 million authorization level in the President's budget.

The two major issues facing our office have been strong leadership and a mandate for change, and I am pleased to announce that a strong leader has been found for the National Climate Program Office, and that is Dr. Alan Hecht, sitting next to me, who is the new Director. He is a recognized expert on climate and a scientist, a leader and a manager. In short, he is just what we need.

Alan will have a chance to get his 2 cents in in a few seconds.

First, let me indicate what has been going on for the last year. During this period of budget reductions, Federal climate activities have fared relatively well. Generally, there has only been a slight decrease, about 1 percent in the amount of money allocated to the various climate elements. That is pretty good, considering all the cuts across the Government. Attached to my testimony are charts which show the cuts. These could be made available to the committee.

Mr. CARNEY. Could I interrupt at that point?

When you say 1 percent, are you considering just climate or are you considering national weather service?

Mr. BELSKY. No, sir, there is a formal mechanism worked out with OMB to separate out what is weather and weather related and what is climate and climate related. We can indicate to you exactly what that distinction is item by item. We are reviewing it again now to see if it is the proper division.

Mr. CARNEY. The 1 percent we are talking about then pertains to strictly climate?

Mr. BELSKY. Climate.

Let me take a second to talk about the changes that we are recommending in the bill. We believe that the Climate Board of the National Academy of Sciences can be constituted to involve other elements of the climate community and, therefore, undertake the work of the Advisory Committee.

Since the activities of the Climate Board are funded by the Federal Government, we believe it is unnecessary to have a Climate Advisory Committee, also funded by the Federal Government, to give advice to the Climate Program Office. So we recommend a deletion of the section mandating an advisory committee.

As a side note, it is clear that if it does not work, this committee always has the power to reestablish the Climate Advisory Committee.

We think for a period of time, on a 1-to-1 relationship with the Academy we can work out the kinds of problems about which you are concerned.

We support a lower level of funding, and we believe that the Climate Program Office should be funded at the level of $1.1 million to support its activities.

There are some other changes in the bill that we would also like to discuss.

In the statute, there is a provision that provides for the Climate Office to have money for climate-related activities to meet the goals and priorities of the program not adequately funded by other agencies.

This has been called the gap-filling section. We believe that since involved Federal agencies will seek sufficient funding to support the high priority programs of interest to them the gap-filling provision of the bill is unnecessary..

We are not saying that the Climate Office should not have money to do appropriate climate activities. We believe that the language, as presently drafted, indicates that the Climate Office should fill in those places where other agencies have an interest, and they should include it out of their own funding accounts.

This is not to eliminate the ability of the climate office to give contracts, grants, or other things like that, but the idea that you are going to have this gigantic pot that we can use and be able to turn around to the Department of Agriculture, Department of State, Department of Interior and say, "OK; you don't have to spend your money. We will give it to you." That we oppose.

NCPO will still have the ability to spend money, but not in the mode the statute indicates.

Mr. CARNEY. Will the other agencies have adequate funding to pursue the types of climate information and data that they would like?

Mr. BELSKY. There is a section in the bill that we support very strongly that can correct that, if it is correctible at all. It requires that each agency put together a comprehensive budget with the assistance of the National Climate Program Office and report to the Interagency Board about all the money that is being spent.

We would then have to report to you where is and how the money is being spent. If it is not being spent appropriately in the agencies, this subcommittee, with responsibility for the oversight of the climate programs, and working with other committees having oversight over other agencies, would determine if the funds are being properly spent.

We believe that a review, on an agency-by-agency basis, is likely to be more successful than giving one agency all the money and telling them to fill in all the gaps. In an ideal world, if there were not other high priority items in the President's budget, we might be able to have some money for gap filling; but we are now going through a situation in which the Federal Government must carefully allocate our resources in the most appropriate manner. At this point in time, we believe that money is not available for the National Climate Program Office to fill in gaps.

Mr. CARNEY. In an ideal world, perhaps other agencies would decide to do them, given a better atmosphere from a budgetary standpoint.

In an ideal world, what you are saying, as far as oversight from this subcommittee, it could be much more effective and I don't mean that in any disparaging way toward the chairman or the other members. We work very hard, but the problem we have been faced with is authorizations and appropriations have not been following calendars. We have not had a budget.

We are circumventing much of the responsibility of this Congress, so we don't have that ideal world. We don't have that ability to ferret out the information that we would like as a committee.

You did say that you will provide that as a matter of general policy to this committee, but for us to come back and say, well, Marty, you are not funding this program the way we would like you to, we are behind already. That is my only concern.

I also share the concerns about the levels of funding that the bill calls for, but I would like to have a closer control on funding.

I am not sure just how this is going to work out, but I am sure the Chairman and members of this committee are going to look very carefully.

Mr. BELSKY. There is one other section where the administration proposes a change. The present statute authorizes money for developing methods and methodologies for interstate, Federal-State cooperative agreements. In this bill, section 3, page 3, lines 12 to 18, page 4, lines 9–14, there are detailed provisions about how that would be carried out.

The administration opposes provisions which allow funding for the actual conduct of State and regional climate programs, as compared to demonstrational pilot projects.

It is the administration's belief, and in keeping with the major thrust of this administration, that if those activities are of sufficient importance to the States, they will be funded at the State level, not the Federal level.

This does not mean that we would not continue to fund demonstration or pilot programs as we have done, to convince, let's say, the States of Connecticut or Pennsylvania, that they should establish a climate program, or to convince certain regional areas that they should get their programs together.

We do the demonstration projects, but we don't believe we should have a responsibility for actually funding State or regional programs once they are in existence.

With all my comments about things we would like to change, I do wish to say we support the management structure set up in the bill, and the provisions that provide for a realistic funding level. In the past the statute provided for total funding of all the climate programs in all the agencies. This bill now provides for the actual funding for the Climate Program Office, and for the interplay between the various Federal agencies, OMB and this committee. I believe that these factors together with the strong leadership of Dr. Hecht, will allow the program to be carried out in a significant and much improved way.

I had a great deal of fun being the Acting Director and learned much about climate, the climate people and the climate community. I am very proud to say that right now I think we are going to have a person taking over in the job who not only is well-respected, but has the management skills which I believe is the major thing that is necessary for this program. He has the management skills to really accomplish the goals that we are trying to accomplish.

With that little opening, I would like Dr. Hecht to say a few words.

Mr. HECHT. Thank you, Marty.

As you know, I don't have prepared testimony today, so my remarks are very informal.

It is a pleasure to sit at this table. The last 6 years that I have been involved in the climate activities with the National Science Foundation, I have often been in this room, sat in the back, the sides and have listened to the testimony and penetrating questions.

Mr. **Scheuer**. You were a back-bencher and now you are a front-bencher.

Mr. **Hecht**. Yes; and it is something. When I first came to Washington, and certainly, as I was growing up in New York City as a country boy, I never thought I would have this opportunity.

It is a distinct pleasure for me to be here.

The only thing I can say at this point is that I am very excited about the national climate program.

I was excited about it when I first became involved nearly 6 years ago when I joined the National Science Foundation. I have been there since and have been in the position of funding research or climate and the impact of climate.

I think I know much of the history of this program. I think many of the difficulties have been identified, and I think the prospects for the future look very bright.

There is, I believe, still strong support for the program in the agencies and in the user community.

I think we will see this in NOAA in two ways initially. One is that John Byrne, who is the Administrator, has asked me to report directly to him. I think this is an indication of the interest that he has in the program and shows his desire to see it succeed.

Both he and Dr. Calio and I have been working very hard in the last weeks, talking about the reorganization and the role that this program can play in NOAA and with the other agencies.

I talked with many people before I accepted this position. I am very encouraged by the very strong support that still exists in the community for a program which is designed to improve the overall management of the resources of this country.

The example is quite clear in agriculture, but it is also clear in energy, water management, city planning, and many, many other aspects of this society.

I believe that there is still an enormous opportunity to make an impact on the management of resources in this society, and I will do what I can. As you can imagine, I am trying to understand how NOAA works internally and not say silly things as I review the program as it now stands. I believe that a year from now, I can will be able to back and report some real progress.

Again, thank you for the opportunity to speak before you today.

[The prepared statement of Mr. Belsky follows:]

Testimony of MARTIN H. BELSKY
Assistant Administrator for Policy and Planning
National Oceanic and Atmospheric Administration
before the
House Science and Technology Committee
Subcommittee on Natural Resources, Agriculture Research,
and Environment

March 16, 1982

Mr. Chairman and members of the Subcommittee, I am pleased to appear before you today to testify on H.R. 5401, the "National Climate Program Amendments of 1982", and to report again on progress of the National Climate Program.

Almost one year ago, this subcommittee held hearings about the National Climate Program Act. Research scientists and climate data users suggested that the National Climate Program needed improvements. Dr. Epstein and I described some of the successes and problems of the National Climate Program. I believed then - and believe now - that the actual National Climate Program - the day to day work done by the Federal agencies - was and is working well. Problems and concerns relate to leadership, management and coordination. A look at the legislative mandate might offer opportunities to improve these elements and reduce concerns. In response to Dr. Werner Baum's suggestions about changes, I offered to lead a cooperative effort to take a hard look at the Program, the Climate Office, and the statute and see if a consensus on changes could be developed among the Federal agencies and outside interests. The Subcommittee accepted this offer and, in fact, made it into an assignment. I am here today to report on the efforts of this ad hoc group and to give the Administration's comments on H.R. 5401. The Administration generally supports the changes proposed in the bill. However, we must oppose the bill because of the authorization level of $3 million provided in Section 9. The Administration supports reauthorization of the Act and requests an authorization of $1.1 million for the operations of the National Climate Program Office.

The National Climate Program needs strong leadership. I am pleased to announce that such a person has been found. With me today is Dr. Alan Hecht - Director of the National Climate Program Office. Dr. Hecht is a recognized expert on climate and a scientist, a leader, and a manager.

I will comment on H.R. 5401 and then describe the achievements of the Program later in my testimony. But let me now make a few general comments.

During a period of budget reductions, federal climate activities have fared relatively well. Generally, there has only been a slight decrease in the funding (about o [illegible] rcent) allocated to the various climate elements. Attached to my testimony are tables showing those changes. The first experimental forecast center is operating at Scripps and a small amount of NCPO money has been tied together with funds from NSF, Scripps itself, and other parts of NOAA to create an effective demonstration project.

The Federal-State cooperative program has shown that there are many opportunities to use climate information for better local and regional climate programs. Studies include the use of climate information in building design, land use planning, a public utility's analysis of new uses of data, and the use of educational TV to present climate information. Other studies are exploring cooperative regional programs in the North Central and North East regions, and are analyzing the potential for state programs in Connecticut, Pennsylvania, and Oregon. I am attaching a more descriptive report on this program to my testimony. In addition, the Program Office supported three other studies of improved climate information applications and climate data coordination.

The National Climate Program depends on lead agencies to direct the work carried out in six priority areas -- "Principal Thrusts". During the last year, NOAA, leading the Principal Thrusts on climate observations and information services work, commenced a major effort to secure more user input into data and information production and dissemination. Two users workshops were held and the results are available. On another Principal Thrust, the Department of Energy (DOE) has the lead for CO_2 research and after a period of restructuring they have now put together an excellent program.

Looking to the future, a World Climate program is developing. The major climate problems and important concerns are global in nature. The answers are global as well.

A review of all these activities indicates that some problems perceived in the National Climate Program are not related to the activities being done. They are tied to concerns about leadership, management and coordination. Let us now move on to what was done since last April to respond to your assignment to propose changes in the National Climate Program Act so as to reduce and eliminate those concerns.

Within a few weeks after your hearing in March of 1981, the Climate Board of the National Research Council, National Academy of Sciences, convened a joint meeting with the statutory Advisory Committee for the National Climate Program and the President of the Association of State Climatologists. All of the Federal agencies participating in the National Climate Program were represented at the meeting. I represented the National Climate Program Office, in my capacity as its Acting Director. Staff members from both Houses of Congress took part in the meeting. The report of the group and its recommendations for Legislative and Executive Branch actions were sent in June 1981 to this Subcommittee jointly from the Chairman of the National Climate Program Advisory Committee, the President of the Association of State Climatologists, and the Chairman of the Climate Board.

The recommendations, with a few changes, are also being endorsed by the Administration at this time. We believe H.R. 5401 closely parallels the ad hoc group's recommendations and the Administration proposal. Thus, we strongly support those portions of H.R. 5401 which provide an institutional framework for improving the program and more adequately responding to the needs of users of climate data and information. However, H.R. 5401 also includes some provisions which the Administration opposes.

o We support a lower level of funding authorization than the $3 million provided in H.R. 5401. In keeping with NOAA's overall budget goals for fiscal year 1983, NOAA will seek authorization of $1.1 million to support activities carried out by the National Climate Program Office.

o We note that there is some duplication of membership and roles by the National Climate Program Advisory Committee and the Climate Board of the National Academy of Sciences. This duplication will become more apparent as we carry out plans to add representation of user interests to functions performed by the Climate Board. For this reason we recommend that authorization for the Advisory Committee be repealed.

o On a more technical note, we urge deletion of the specific authorization to "make annual grants to any State or group of States ..." /Section 3 (H.R. 5401), page 4, lines 9-14/. This measure is unnecessary in view of authorization provided earlier in the same section that allows the Secretary to provide financial assistance in the form of contracts, grant, or cooperative agreements to carry out priority work not adequately addressed in Federal programs. /Section 3 (H.R. 5401), a.(3). page 3 - line 12-18/.

o The Administration opposes the provision of the bill that authorizes the Secretary of Commerce to provide financial assistance for climate-related activities that meet the goals and priorities of the Program if not adequately funded by other Federal agencies. We believe that the involved Federal agencies will seek sufficient funding to support the high priority programs of interest to them.

o The Administration also opposes the provision which provides for the conduct of State and regional climate services and functions. In keeping with the major thrust of this Administration, we believe that if these activities are of sufficient importance to the states, then these functions should be funded at the state level.

This completes my analysis of H.R. 5401. Following my testimony, I would be pleased to comment at greater detail on the proposed amendments if the committee wishes.

Now I would like to report briefly on progress in the National Climate Program and activities of the Program Office. Last year, I described work started on high priorities ("Principal Thrusts") of the Program. Work has continued on these multi-agency efforts. Principal achievements and activities in each priority category are as follows:

Category I. Providing Climate Products

Under NOAA's leadership, the Principal Thrust "Generation and Dissemination of Climate Information" focused attention on better identification and interaction with users of climate data. The Environmental Data and Information Service (EDIS) and NCPO formed a Climate Information Users' Group with broad representation from trade professions and business sectors. A workshop to identify users' needs and approaches for meeting them was held by the Environmental Data Information Service, in conjunction with the fourth conference on the Economic Value of Climate Information. Completed projects provide the hourly temperatures needed by building contractors in Colorado; initiated the development of a climate data base needed for water supply planning in Connecticut; and will provide to the people of Oklahoma information on the use of climate as a resource. Regional climate programs are now being sponsored with joint Federal-State funding in the North Central and Northeastern States.

The Principal Thrust "Climate Prediction", also led by NOAA, made progress with the establishment of the Experimental Climate Forecast Center at the Scripps Institution of Oceanography, La Jolla, California. Several methods of forecasting seasonal climate over the conterminous States are being tested and new methods for evaluating forecast skills are being developed at the Center. Even though climate forecasting is an experimental and highly uncertain skill, there is interest in better determining what kind of climate forecasts and related information will be most useful. NOAA's Climate Analysis Center(CAC) addressed these needs at a workshop held with industrial and agricultural scientists. Proceedings of the workshop were published by CAC.

Category II: Responding to Impacts and Policy Implications of Climate

There continues to be much interest in trends and expected climate effects of atmospheric carbon dioxide. Leadership for the Principal Thrust in this area is provided by DOE. Major actions during the year included planning to concentrate research on measuring the increase in atmospheric carbon dioxide and evaluating its direct effects on climate and vegetation. Progress in achieving interagency cooperation was noteworthy, as demonstrated by agency participation in a coordinating committee, and definition and acceptance by agencies of specific responsibilities in the CO_2 research program.

The Principal Thrust "Climate and World Food Production", led by USDA includes a broad range of agricultural research and crop assessment activities which take account of climate variability. Increased research attention is being given to understanding plant/climate relationships, and development of crop yield models suitable for regional and national production assessment.

Category III - Understanding Climate

The Principal Thrusts in this category address the two areas also recognized in the World Climate Research Program: radiant energy and oceanic heat. Both are necessary for modeling and forecasting climate.

Solar and earth radiation constitutes a Principal Thrust of the National Climate Program because the Earth as a planet receives and gives off energy only through radiative means, chiefly as shortwave (solar) radiation and longwave radiation. Energy flows to and from the earth in these two spectral regions are influenced, though in different ways, by the make-up of the planetary atmosphere and the characteristics of land, snow and water surfaces. Monitoring atmospheric conditions on a planetary scale has begun in NASA as lead agency, and summaries of aerosols and ozone were compiled on a global basis; further studies were done on effects of aerosols from Mt. St. Helens, and on gases other than CO_2 present in low concentrations in the atmosphere but radiatively active. Cloudiness data have been used in climate models, and monitoring of this fluctuating factor is being intensified. The input of energy to the planet from the sun has now been measured accurately for a few years, and found to vary over short periods by 2-3 watts per square meter as has been suspected for a century but could not be measured earlier. Studies of longwave radiation going out from the planet show variability with season and latitude, and also differ between the Northern and Southern Hemispheres. As record-keeping of clouds and aerosols continues, the radiative energy basis of climate can be modelled more realistically and the effects on the variability of climate better understood.

Ocean heat transfer and storage constitute a Principal Thrust because the water bodies of the planet Earth are not only extensive but also good absorbers of the input of energy from the sun, which they store readily and pay out as needed, smoothing and modifying the variability of the planetary climate. The ocean also transports heat efficiently from low latitudes to high. In high latitudes this heat enters into seasonal and other variations in climate of the adjacent lands. Current and historical data on sea-surface temperature have provided bases in research at NSF as lead agency and other agencies for many recent climate models and prediction methods. Movement of heat poleward is, however, unsteady, and is affected by year-to-year differences in ocean temperatures and currents. In 1981, research on the Southern Oscillation, El Nino phenomenon, and associated equatorial oceanic circulations was pursued further, and relationships established with North Pacific sea-surface temperatures and North American winter weather. Other phenomena of the Southern Hemisphere oceans may also have global significance, such as the extent of Antarctic sea ice, its variability and possible long-term melting, and the flow of water in the Antarctic current.

An important function of the National Climate Program is to adapt participation in international activities to U.S. climate priorities. In climate, international agencies have been quite active. This is particularly true of the World Meteorological Organization and the International Council of Scientific Unions. The World Climate Research Program seeks to carry out many cooperative research projects, and it is our responsibility to see that U.S. interests are both coordinated and strongly represented.

The global nature of climate makes it an appropriate study among nations. Climate unites us all in many ways. There are great benefits of collaboration, through international bodies and programs, and through cooperation with other nations. One such beneficial agreement is the U.S./U.S.S.R. Agreement on Protection of the Environment. We shall try to establish other bilateral agreements and expand cooperation under present agreements.

Finally, I would like to report briefly on activities of the Program Office which are noteworthy, both as contributions to Program priorities, and as initiatives for future Program activities.

The Intergovernmental Climate Program is a major initiative of the Principal Thrust on climate information. Each project is designed to provide information for present use. From time to time since the first projects were started, the Program Office has released an informal letter describing the current status of the program and its plans.

The other major program responsibility carried out by the Program Office is for experimental climate forecasting. Last year a major initiative was added to the Principal Thrust on climate prediction when the first Experimental Climate Forecast Center was established. The immediate objective is to provide and verify experimental forecasts of temperature and precipitation for each season of the conterminous United States. Experiments also are being conducted on seasonal forecasting one and two seasons in advance. Three different and independent forecast procedures developed by the Scripps climate research group are being tested. An important component of the testing underway is to develop effective methods of determining forecast skill.

Forecasts of seasonal air temperature and precipitation in three classes were prepared at Scripps for summer and fall 1981 and winter 1981-82 from a blend of very large scale ocean and atmosphere indicators. These include variations in surface temperature of the North Pacific, upper atmospheric pressure fields over the Northern Hemisphere, and near-surface air temperature over the continental United States. Synoptic, statistical, and physical relationships were combined in making these forecasts. Computerization of the records of past forecasts and observations has made possible the development of forecast verification methods. Calculations have been made of the statistical probabilities of correct forecasts and of the degree to which the forecast misses the observed condition. A specified high level of accuracy was reached by only one temperature forecast method in the summer of 1980, but by all four in the summer of 1981. This new analysis method is useful for ranking forecasts and forecasting methods, and for rating the predictability of a particular season.

The Program Office also has supported research and application tests leading to the use of advanced technology for obtaining and analyzing climate data. Research completed at the University of Florida demonstrated the feasibility of using satellite data to identify areas in the State most likely to experience damaging cold temperatures. The location and size of these areas varies from year to year but is remarkably persistent for a given season, once identified. The University of Nebraska is doing research on ways to collect and use automated hourly data to schedule application of irrigation water. Other agricultural applications of the data also are being explored, such as for grain drying, and pest and disease management.

As part of another study supported by the Program Office, the University of Wisconsin convened a Workshop of specialists in climate information development and applications. The Workshop participants discussed the quality of data available to them and made specific recommendations for measurements needed in urban applications and to improve the coordination of data acquisition and dissemination. The Program Office has begun discussions with EDIS on the implementation of the recommendations.

Members of the Program Office also carry out research. A staff member of the Program Office and the former Director recently published a paper in Science which reported the relationship between the rise in global mean sea level to polar ice melting and changes in global air temperature. The paper has received considerable attention in the press.

Since it was established, the Program Office has initiated or contributed to a number of workshops and conferences to improve program planning and implementation, and to help integrate the climate community. Activities which the Program Office has sponsored or supported have been concerned with such topics as impacts of climate change, users' requirements, planning climate data networks and information systems, and diagnosing or understanding recent climate. We foresee even greater emphasis in the future being given to program planning and development activities such as these.

That concludes my testimony, Mr. Chairman. I will be glad to respond to any questions you have.

Mr. SCHEUER. Thank you very much.

Now we will hear from J. Dawson Ahalt, Deputy Assistant Secretary for Economics, Department of Agriculture.

STATEMENT OF J. DAWSON AHALT, DEPUTY ASSISTANT SECRETARY FOR ECONOMICS, DEPARTMENT OF AGRICULTURE, ACCOMPANIED BY NORTON D. STROMMEN, CHIEF METEOROLOGIST, WORLD AGRICULTURAL OUTLOOK BOARD

Mr. AHALT. Thank you, Mr. Chairman.

I appreciate the chance to visit before you and the other committee members here today.

I have with me today my colleague, who is located the second from the left, Mr. Norton Strommen, who is the chief meteorologist with the World Agricultural Outlook Board at USDA.

Mr. SCHEUER. I didn't get that title.

Mr. AHALT. Chief meteorologist with the World Agricultural Outlook Board at USDA.

Mr. SCHEUER. Can you tell us very briefly what is the World Agricultural Outlook Board?

Mr. AHALT. That group is responsible for coordinating and clearing all of the Department of Agriculture's supply, demand, price forecasts, that the Department makes for crops produced here in the United States, livestock and crop production all around the world.

Mr. SCHEUER. Livestock here in the United States or all over the world?

Mr. AHALT. All over the world.

I cite that because it gives an indication of how important climate and weather activities are to us in the Department. We take them very seriously, and that is why we appreciate the chance to comment on the national climate program here today with your committee.

What happens in terms of climatic and weather events are important not only in the United States but all around the world.

Mr. Strommen coordinates an activity that we carry out with NOAA which looks at weather events and assesses the impact of those events on crop and livestock production. They do this every day, keeping very close track of all weather developments.

Mr. **Scheuer**. Is it your office that produces the estimates of Russian agricultural production?

Mr. **Ahalt**. Our office clears those estimates. We coordinate with the intelligence community; yes, sir, we do.

Mr. **Scheuer**. Please proceed.

Mr. **Ahalt**. That is a good example of how important these activities are to our work.

The Soviet crop is a classic example. Because of this importance and because we are in a period of tight budget, we believe that the national climate program is important in its role in coordinating all the various activities related to climate and weather, and we in the Department support that effort.

We believe that the changes in H.R. 5401 go in the right direction, and we look forward to continuing to participate in this program.

That is really all I have to comment on, Mr. Chairman.

[The prepared statement of Mr. Ahalt follows:]

For release only by
the House Committee on
Science and Technology

Statement by
J. Dawson Ahalt
Deputy Assistant Secretary for Economics
U.S. Department of Agriculture
before the
House Committee on Science and Technology
Subcommittee on Natural Resources, Agriculture
Research and Environment
March 16, 1982

Mr. Chairman and Subcommittee members, my name is J. Dawson Ahalt, Deputy Assistant Secretary for Economics with the Department of Agriculture. With me today is Norton D. Strommen, Chief Meteorologist with the World Agricultural Outlook Board.

As a representative of the U.S. Department of Agriculture, I appreciate the opportunity to appear before the Committee to discuss the activities of the National Climate Program (NCP) in meeting the climate and weather needs of the nation. As you know, the agricultural sector is highly dependent on weather developments. Moreover, the nation's weather services were an important part of the Department of Agriculture from 1890 to 1940 prior to its transfer to the U.S. Department of Commerce.

During the half century that the weather services were a part of USDA, many basic programs that were developed supported the rapid growth of the world's most efficient agricultural production system.

Today's global agricultural production system is increasingly sensitive to weather events which can impact upon many diverse activities. This impact influences vulnerability of crops and livestock to sharp temperature swings, periods for planting and harvest, the ability to use aircraft for crop spraying and dusting, field conditions for large equipment to avoid compaction of soils, application of herbicides and pesticides, and the scheduling of irrigation to name a few activities. The outlook for water supply to be used for irrigation in the desert southwest is determined by monitoring snow-pack buildup during the winter months over the western mountains. In addition to the many short term producer decisions, climatic developments continue to impact longer term agricultural planning decisions. The latter work depends on maintenance and analysis of historic climatic data, a highly important information source for the agricultural community. This information is the starting point for all climate work. Without these data, understanding the frequency and full range of weather events to be expected in the future would be impossible.

Studies of the relationship between plant response and observed weather events during the last half century by USDA's agricultural research scientists provided a foundation for understanding the world's food production capability. Understanding the importance of weather events on crop and ~~livestock~~ ~~output~~ livestock output and carefully evaluating the impacts are the basis for a Joint Agricultural Weather Facility (JAWF) created in the Department of Agriculture in 1978. JAWF is staffed by National Oceanic Atmospheric Administration (NOAA) meteorologists who monitor global weather events and interpret forecasts and USDA agricultural meteorologists who assess the weather events impact on U.S. and world crop conditions, growth and vigor, and crop yield potential as the growing seasons unfold. This effort relies heavily on a network of surface observational data--a part of the World Meteorological Organization's World Weather Watch and Climate Programs--and integrates meteorological satellite data as augmentation information to monitor general weather patterns in data sparse areas, particularly over the oceans and many portions of the tropics. The historic climatic data are invaluable as a reference in crop yield impact work. We view the JAWF work as a prime example on how two weather-sensitive agencies can cooperate to ensure that information and assessment activities are enhanced, by appropriate integration of historical climatic and current meteorological data and forecasts.

While research is crucial to future development of new analytical tools, in times of tight budgets it is even more important to use the capability provided by past research efforts in addressing today's problems. We cannot neglect the basic ground truth data networks that have served us so well in the past for promises that high priced new technology will do the job better, until this is a confirmed fact. This confirmation must include a careful evaluation by the potential user agency.

New technologies must enhance the current applications and services available at a cost which is at least competitive with the current state of the arts. This will require tough decisions on how to use the very limited resources available. USDA looks forward to cooperating with other agencies through the NCP to ensure that available resources are directed toward achieving maximum return from NCP's activities.

Key legislative changes proposed for the NCP are: the enhanced role of the Climate Program Policy Board, elimination of the matching funds requirements of the intergovernmental program, adjusting the date for submission of annual reports and the frequency for revision of the 5-year plan.

I believe these proposed changes in the NCP legislation presented in H.R. 5401 will enable USDA to better participate to achieve an improved climate program for the nation.

Mr. **Scheuer**. Are you satisfied with the level of funding that is in the authorization?

Mr. **Ahalt**. That is always a difficult question, Mr. Chairman.

Given the resources that we have to operate with, we are simply going to try to do the best we can.

We believe, however, that the coordination of looking at the various weather activities that go on throughout the government is a very important one, and the climate program performs a useful function in looking at a close functional breakout on those undertakings.

Mr. **Scheuer**. Very good.

All right, let's hear from Dr. David McClintock, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State.

STATEMENT OF DR. DAVID W. McCLINTOCK, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, DEPARTMENT OF STATE

Dr. **McClintock**. My prepared remarks are very brief.

Mr. **Scheuer**. OK.

Dr. **McClintock**. I am pleased to be able to speak on behalf of the Department of State in this hearing, having represented the Department in frequent working level contacts with the National Climate Program Office during the past 2½ years. For reasons that I will outline in these brief remarks, we are strongly supportive of the entire national climate program effort and thus have studied the 1982 amendments to the program act with considerable interest.

The key provisions of H.R. 5401 indeed appear to strengthen or otherwise improve several administrative aspects of the overall program effort. The creation of a Climate Program Policy Board responsible for long-range planning and budgetary recommendations is a positive step, and we note with satisfaction that in accordance with the reference to section 5, subsection (b)(2) of the original National Climate Program Act, the Department of State will be represented on the Board. Likewise, having maintained close working level relations with the National Climate Program Office, we are pleased that this office will be retained in order to function as a staff to the Policy Board.

As the committee is aware, the Department of State is not a program agency, and thus does not fund or otherwise direct implement specific activities that are a part of the ongoing national climate program. However, many of these activities have international implications and are therefore closely related to our foreign policy coordination role. My own bureau—the Bureau of Oceans and International Environmental and Scientific Affairs—has either oversight or specific international negotiating responsibilities for climate-related issues. We are frequently involved in bilateral and multilateral discussions with other nations on air and water issues, the marine environment, decertification monitoring, and scientific and technological aspects of the global food problem, many of which are climate related.

Needless to say, the vexing CO_2 atmospheric problem is yet another concern. In the interest of time, I will skip over a couple of things I trust will be entered into the record, and I would like to move to a point where we had a recommendation on a seemingly minor point of language, view of diverse responsibilities of the Department of State, as one of several points of contact between the United States and international climate efforts, we do believe that the words, "in consultation with the Department of State" should be inserted in section 3, paragraph (2)(e) of these 1982 amendments between the words "coordinating" and "interagency."

We recognize that the National Climate Program Office is the logical organization to take the lead responsibility for this interagency coordination effort, and as I previously mentioned, we have enjoyed close working relationships with this office in the past and would anticipate such a relationship in the future. However, this suggested minor change in language would recognize and assist the Department of State—specifically the Bureau of Oceans and International Environmental and Scientific Affairs—in fulfilling its formal responsiblities both in the conduct of foreign policy and with regard to monitoring and maintaining formal records on all bilateral and multilateral programs that fall within the scope of our international science and technology agreements.

We are responsible to the Congress for maintaining a close and accurate check on international S. & T. treatments between the United States and other countries, and we certainly anticipate that many good things will come out of the national climate program in cooperation with the world climate program; we want to be sure that we are abreast of these and can participate and help where we can.

Mr. Chairman, those are my abbreviated remarks, and I thank you very much for being able to speak here today.

[The prepared McClintock statement in full follows:]

TESTIMONY BY DR. DAVID W. McCLINTOCK,

BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS

DEPARTMENT OF STATE

BEFORE THE HOUSE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

MARCH 16, 1982

Mr. Chairman:

I am pleased to be able to speak on behalf of the Department of State in this hearing, having represented the Department in frequent working level contacts with the National Climate Program Office during the past two and one half years. For reasons that I will outline in these brief remarks, we are strongly supportive of the entire National Climate Program effort and thus have studied the 1982 amendments to the Program Act with considerable interest.

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As the Committee is aware, the Department of State is not a program agency, and thus does not fund or otherwise directly implement specific activities that are a part of the ongoing National Climate Program. However, many of these activities have international implications and are therefore closely related to our foreign policy coordination role. My own Bureau -- the Bureau of Oceans and International Environmental and Scientific Affairs--has either oversight or specific international negotiating responsibilities for climate-related issues. We are frequently involved in bilateral and multilateral discussions with other nations on air and water issues, the marine enivronment, desertification monitoring, and scientific and technological aspects of the global food problem -- many of which are climate-related. Needless to say the vexing CO_2 atmospheric problem is yet another concern. In addition the

Department of State, following the mandate of the original Climate Program act of 1978, has supported U.S. involvement in the World Climate Program, which was launched at the World Climate Conference in 1979 in accordance with recommendations of the Eighth World Meteorological Congress. We perceive the U.S. National Climate Program and World Program as mutually supportive. A strong, efficient U.S. effort cannot help but contribute to the global one, and both should promote an essential understanding of climatic forces that over the long run will save vast financial sums thorough payoffs in such areas as agricultural development and natural disaster avoidance.

The Department's OES Bureau works very closely with the United Nations Environment Program, headquartered in Nairobi, on a number of global environmental issues. One of these is the Global Climate Impacts Study for which UNEP has lead responsibility. Through annual meetings of the UNEP Governing Council and other contacts we have been exploring possible future activities in the area of arid lands studies. For example, we have discussed possible cooperation with Mexico on a climate impact study of our arid border region that could have the dual result of assisting new crop development in the two nations and at the same time providing a regional contribution to the worldwide UNEP effort. From the brief foregoing comments, it can readily been seen that an increasingly efficient, effective National Climate Program cannot help but have positive spillover effects in these international climate efforts where we are constantly involved.

It perhaps may be perceived as a minor point , but in view of the diverse responsibilities of the Department of State as one of several points of contact between U.S. and international climate efforts, we believe the words "in consultation with the Department of State" should be inserted in paragraph (2) (E) of Section 3 of the 1982 amendments, between the words "coordinating" and "interagency". We recognize that the National Climate Program Office is the logical organization to take the lead responsibility for this interagency coordination effort and, as I previously mentioned, we have enjoyed close working relationships with this office in the in the past and would anticipate such a relationship in the future. However, this suggested minor change in language would recognize and assist the Department of State -- specifically the Bureau of Oceans and International Environmental and Scientific Affairs -- in fulfilling its formal responsibilities both in the conduct of foreign policy and with regard to monitoring and maintaining formal records on all bilateral and multilateral programs that fall within the scope of our international science and technology agreements.

Mr. Chairman, thank you very much for allowing this opportunity for the Department of State to comment on what it regards as helpful amendments which will enable the United states to contribute to and benefit from international progress in climatology.

Mr. SCHEUER. Thank you very much.

Mr. Carney.

Mr. CARNEY. I would first like to start by welcoming Dr. Alan Hecht as the Director of the national climate program, and it is I guess, quite coincidental that we have a representative of my high school and college in one panel, but there are six members of this panel.

I would like to ask Marty a couple of questions. You would be the proper person at this particular time to answer the question.

I would like to know the justification for the administration's disagreement in the gap funding area?

Mr. BELSKY. The concern of the administration is that as we go through a budget tightening process, each agency coordinates the decision on how climate money will be spent. Then OMB coordinates the various budget recommendations, and the budget goes to the President who makes the decision on funding.

There is a difference in the administration's mind between having one agency having money to spend on climate priorities, which the National Climate Program Office does under its general authorization, and one agency having the power to say OK, we believe that Agriculture should have spent more money on this or that, but because they didn't, we will give them the money.

The idea of gap filling is something that may be appropriate in an ideal world with more money available to the various Federal agencies, but still it seems to me to be a way around the ordinary budget review process.

Mr. CARNEY. The other area where the administration takes exception to the bill is the funding for State and regional climate services and functions. Is that an overall philosophical thing, part of the new federalism or any other justification for the administration?

Mr. BELSKY. There is some misunderstanding. We are opposed to the actual funding of State and Federal services and programs, we are not opposed to providing a prototype mechanism to develop such programs. And, yes, it is part of the new federalism concept. If the States wish to have those actual programs after we have demonstrated their utility, they should pay for them, themselves.

Mr. CARNEY. I can appreciate what you say as far as the conduct and now we are going to look at the Federal role in trying to induce the States to become active in these programs.

How much further does the Federal Government have to go in this area? How many States are on board and how many more States would we like to encourage to come on board with climate programing?

Mr. BELSKY. We sent to the administration a copy of the intergovernmental climate report which reviews those things. I don't know, maybe somebody else can help me back here. How many States have climate programs?

Mr. ROBINSON. Forty States have State climatologists, but they range, I must add, from full-time personnel——

Mr. SCHEUER. Excuse me, could we have your name?

Mr. BELSKY. Peter Robinson, in charge of the intergovernmental program of the National Climate Program Office.

Mr. SCHEUER. Come up to the table, Mr. Robinson.

Mr. **Robinson**. Of the 40, approximately 7 have full-time State climatologists, and another 25 have State climatologists who are usually doing this job in addition to their normal full-time activities. Many of them would be faculty members at universities who have the normal faculty responsibilities. But in addition, are climatologists, and to say that there are 40 of them is somewhat misleading.

Mr. **Carney**. There is still a necessity for the Federal involvement here in that area?

Mr. **Belsky**. For two things. One is to demonstrate to those States that do not have a program that they would benefit from such a program.

Second, we have a number of projects, such as in the north central region, where we are demonstrating that they should cooperate on a regional approach to be mutually effective.

We believe those pilot programs should continue, but once a program is established, we do not believe the Federal Government should fund the conduct of those programs.

Mr. **Carney**. Dr. Baum, you may contribute.

Mr. **Baum**. I think the administration's position oversimplifies the situation considerably. First of all, the amendments before you do not mandate the Secretary of Commerce to do anything. They say the Secretary of Commerce may do certain things, and by enumerating these things you are providing congressional guidance to the executive branch on matters which you deem to be of some consequence. I hope you do believe them to be of some consequence.

Furthermore, this program is not confined to State governments. It is called the intergovernmental climate program, but it involves much more than State governments. There is a sentence which the administration proposes to strike, and it says that the Secretary may make annual grants to any States or group of States, such grants to be made available to public or private educational institutions, to State agencies, and to other persons or institutions qualified to conduct climate-related studies or provide climate-related services.

This is a very broad provision which urges the Secretary of Commerce to use whatever available mechanisms there are to stimulate the development of climatic information and its application in American commerce, industry, agriculture and society in general.

Mr. **Carney**. Going back to Mr. Belsky on that point, the word "may" is the key word here. If the bill is passed with that language in it, and I assume that the administration would like it, "may" puts the ball in the administration's court. They can decide what to do or what not to do. Is there any problem with that? That is confusing.

Mr. **Belsky**. The present statute provides, and I quote:

> For money to be spent by NOAA or other Federal agencies for mechanisms for intergovernmental climate related studies and services, including participation by governments, the private sector, and others concerned with applied research and advisory services.

That is the existing statute. When you add the phrase, "to include moneys to the States" to then do these things, we believe, it is a strong recommendation to the administration, to get involved in State funding of private activities. For example, we now have the authority to fund universities.

Mr. SCHEUER. Who is we?

Mr. BELSKY. The National Climate Program Office, which already has the authority under existing law. We are not proposing that that authority be eliminated. However this recommended change in the bill would authorize the National Climate Program Office to fund States who, in turn, would then fund private and academic institutions. That new provision concerns us.

Mr. SCHEUER. You don't want that authority?

Mr. BELSKY. No; we already have the authority to do it directly. We believe, however, that if we are going to give money to the States who will, in turn, fund the universities, it would be better if the States were to fund such programs from their general revenue sources.

Mr. SCHEUER. Wouldn't there be some advantage to the Federal Government and the States having some king of joint decisionmaking process and deciding together which universities, or consortiums of universities, should be funded?

Mr. BELSKY. There is no question that that is appropriate and that will occur. One of the reasons that the National Academy of Science Climate Board and other organizations meet with Government is to work those things out. But our concern is in the double step of having the Federal Government give States *x* Federal money so that the State will, in turn, contract with the private sector. In the present situation, the Federal Government decides after consulting with the States, how the money should be spent.

Mr. CARNEY. Thank you, Mr. Chairman.

Mr. SCHEUER. I suppose the matters of who is consulting with whom and at what point in process, is something that could be worked out informally; could it not?

I don't know why you are going after that provision of the legislation because of some question as to who should consult, and when they should consult. Why couldn't that be worked out on a collegial basis?

Mr. BELSKY. It will be worked out, but the concern is the clear language in the statute, proposed H.R. 5401.

Although we support most of the provisions in the statute, that specific language runs directly against the administration policy. Present policy dictates that if money goes to the States from the Federal Government, the States are free to spend that money on anything they want, rather than having the money earmarked for climate, pollution control or other specific programs.

We believe revenue sharing is a different issue than having direct grants. It is a philosophical issue, to get back to Mr. Carney.

Mrs. SCHNEIDER. I wonder if I might ask a question.

Dr. McClintock, you had mentioned in your testimony that the Department of State is involved in monitoring such things as deforestation, the greenhouse effect and that sort of thing. Could you tell me to what degree the data that you are collecting from the monitoring process is integrated or cross-referenced with groups like CEQ?

Dr. MCCLINTOCK. Actually, it is not so much that we are monitoring the technical content of these studies, but rather we are monitoring the agreements that are occurring between our Nation and other nations, and there is a whole series of bilateral agreements.

Mrs. SCHNEIDER. Not the research data?

Dr. McCLINTOCK. That is correct. Our Bureau is responsible to the Congress in keeping close tabs on these arguments and that is why we must work with all other departments and agencies in the executive branch of the Government to make sure that nothing is being concluded that we are not aware of, so we don't eliminate this from our scorekeeping.

Mrs. SCHNEIDER. When one looks at the scorecard, is the United States holding up their end of the deal in these different areas?

Dr. McCLINTOCK. I would say in terms of present efforts, consciousness raising, we probably are.

That is over a period, let us say, of 5 or 10 years, perhaps our record may be better in one year and worse in the next, but a good example would be in 1978—the Strategy Conference on Tropical Deforestation, and there was a climate component in that. Unrelated to climate, we just organized a similar conference in biological diversity.

By such conference efforts, we are trying to raise consciousness levels and attention in other countries to enhance cooperation. And I might add, we do perform one other function, and that is an information clearing function. We have a network of 22 science attachés in 22 of our embassies abroad, and quite often these people act as conduits.

We have a mission in Geneva which regularly interacts with the World Meterological Organization.

Mrs. SCHNEIDER. What is the international concern for the greenhouse effect by other nations?

Dr. McCLINTOCK. It is a concern that exists primarily among scientists rather than nations specifically.

The more advanced nations with a S. & T. infrastructure are more concerned.

Mrs. SCHNEIDER. Isn't some of that information that the scientists are articulating translated into policy by several nations and are there not other nations in the world who take the lead in mitigating measures, information?

Dr. McCLINTOCK. Yes indeed, and if we can get back to the forestry issue, this becomes a sensitive one because you may have a situation where scientists in industrial countries are worried about tropical forests which are not presently within their boundaries and are issuing warning statements which some tropical nations regard as interference in their internal affairs. So it does pose problems for us, having to convince while making sure that we are coming up with the right information, and let us say, not crying wolf, or not overstating a case.

Mr. SCHEUER. You have that situation concerning forests. In the northern industrialized nations, you have a tremendous problem of acid rain affecting Canada's forest industry. I met last week with a group of Members of the House and Senate and a number of Canadian parliamentarians. They are absolutely beside themselves with anger at the way they feel we are sweeping this whole problem under the rug and defaulting our clear obligations under the 1978 agreement to get on with the business of control measures for acid rain. They feel that President Reagan made a commitment shortly after he took the oath of office, to Prime Minister Trudeau in the Ottawa Conference where he pledged the United States was going to take effective action. They feel very bitter that our country is stonewalling.

And to my knowledge, the Scandinavians feel exactly the same way about England, France, Germany, Belgium and Holland, who are washing their dirty laundry in Scandinavia's backyard. The fumes and the debris from all of Europe's production seems to end up polluting Scandinavia so you have a tremendous problem. You have the same problem you have in terms of the threat to the tropical forests.

Mrs. SCHNEIDER. I am concerned if the United States falls behind. I have some inkling to think that we are, insofar as showing concern for the greenhouse effect, for allowing us to lessen our emphasis on clean air and allow us to continue to burn coal without taking measures to minimize the various types of pollutants. I am concerned about the international ramifications that also occur. It seems to me in this world we are currently in a very unstable situation as the United States coming from the last administration, not knowing where we were on various foreign policy issues.

I think in terms of treaties and various agreements that you have jurisdiction over, these things will begin to add up and the United States credibility and support for the United States, will be sorely damaged. I would appreciate it, if at some point in the future, you can tell us how many agreements we are currently involved in and how many we have slid behind in.

I am getting bits and pieces of information from various sources that we are not holding up our end of the deal and I don't like to hold my head down in the international arena. I am concerned about it.

Thank you, Mr. Chairman.

Mr. SCHEUER. Thank you, Mrs. Schneider.

To continue the line of questioning that Mrs. Schneider led us to, the whole question of global environmental monitoring, do you feel that there is more that we should be doing in this area? Perhaps we should be organizing a further cooperative effort in global environmental monitoring in which we get nations to contribute what they can without great expense, putting all kinds of sensor and monitoring and measuring devices on their ships, their aircraft, their satellites, that would report into a common pool on the subject of concern like acid rain; like the carbon dioxide or the greenhouse effect as we call it; like deforestation, loss of species that you refer to; like soil erosion; like crop blight; plant blight.

Would this be something that would be timely in terms of bringing peace between developed nations like Canada and the United States? And like the countries in the European industrial belt that I mentioned, as well as giving sort of a comprehensive supply of very important data, coming mostly from the developed nations, but hopefully from developing nations as well that are most concerned with deforestation and decertification and the like?

Can you see any way that the United States, can improve its performance, perhaps working with an informal consortium of countries, or perhaps working through existing U.N. nations like UNEP and the World Meterological Organization. Should we be trying to do a better job in environmental monitoring of all of these phenomena that we have been discussing and in distribution of satellite information and the rest to the developing world for the use of their policymakers?

Dr. McClintock. Mr. Chairman, I think the answer to your last question is certainly, we should do a better job simply because there is so much to be done, and relatively speaking, we all started only fairly recently, and therefore, an enormous amount remains to be done.

The Food and Agricultural Organization—FAO—in Rome is very actively engaged in collecting climate data as it pertains to agriculture, and this can be projected into crop forecasts, just as we do and this is very valuable. Anytime you get north and south—the advanced and the developing nations—working together, and feeding in and drawing from common data, it is going to be beneficial.

However, I feel that we really have the infrastructure in place. We have the world climate program and our national climate program, which were both formed within the last few years. What we need to do now is take this infrastructure, speaking of the world climate program, as nebulous as it may be, and simply move ahead, do something, and then see where the weaknesses are and fix those.

Mr. Scheuer. What are we doing now in terms of putting adequate resources into it so that we are developing the environmental monitoring data that nations need to get their own environmental hazards in order?

Dr. McClintock. They do make financial contributions to this and scientists do work together and the data is being exchanged.

My feeling is that we simply need to do the same thing faster, and gain more experience doing it. Really, I don't think we need to invent new mechanisms.

Mr. Scheuer. Do you think an adequate institutional framework exists at the present time?

Dr. McClintock. We have enough at least to start with but I am quite sure that the institutions are not fool proof. There are lots of flaws in them, but what we need to do is move ahead as rapidly as possible and fix those faults as they show up.

Mr. Scheuer. Mr. Hecht.

Mr. Hecht. The question of monitoring is extremely important, and also part of the activities of the world climate research program, the WMO and UNEP. Let me bring to your attention the fact that next week, the WMO and UNEP will convene a conference of experts on climate monitoring. This climate monitoring planning activity has gone on for several years, and the United States has always been an active participant in the discussions.

The international community has reached a point where it has recognized the great need to monitor many things. One of the important gains that we see developing from this meeting is a better underlying strategy for what to monitor, how the monitoring effort should be organized, and how the data, once collected, should be treated and made available to all members of the WMO.

There has not been, in the past, a good research strategy that underlies the general data collection and monitoring. You can monitor large number of things and I think the meeting that will be held next week will contribute in this way. And Mr. Chairman, if you would like, since we have a representative who will represent the national climate program in the Department of State, we will have him provide you with information.

Mr. SCHEUER. Who is that?

Mr. HECHT. Mr. Josh Holland, who was the Director of the Center for Environmental Assessment Services in NOAA. He will report back to us when he returns. I would be happy, if you like, to make his report available to you to give you an idea of where things stand in the international arena with respect to the general monitoring of climate variables.

Mr. SCHEUER. I think we would like to have his report, but I think we would like to meet with him informally, perhaps over a cup of coffee someday.

Mr. HECHT. That would be quite good.

Mr. SCHEUER. I would go farther, I don't know what you included under the rubric of climate when you talk—would this include deforestation and desertification?

Mr. HECHT. The WMO perspective on this is quite broad, as it must address all of the concerns of the member organizations. It is broad enough to include weather parameters as well as climate parameters and their impacts.

We will be happy to make that report available.

Mr. SCHEUER. Are you satisfied that we have the basic institutional framework in place to do the job? Now we have to get more involvement of countries around the world and more resources put into it, and increase the information.

Mr. HECHT. Yes; I would agree with that.

Mr. SCHEUER. The legislators have done their job, and now it is a question for simply implementing the mechanism we have established.

How about funding? Is there adequate funding in this total environmental monitoring program, whether by NOAA or WMO or UNEP? Is there adequate total funding in this effort?

Mr. HECHT. It is hard for me to answer. I am still trying to figure out how NOAA functions. I still have to understand the WMO, with all its complicated structures and its resources. But at this meeting they are making long-range plans and I expect that resources are quite restrictive to both organizations on an international level. And I think that whether the adequate resources are addressed to the problems depends on how we can best use the existing systems that are there, and what real needs can be identified which have to be addressed.

Mr. SCHEUER. I am asking you what now. This is the whole purpose of the question. What are those real needs, and are they being properly addressed through the structure we now have in place? If there is a problem, is it a funding problem or an institutional problem?

Mr. HECHT. A number of the data problems are also institutional problems. This is so because although we collect a massive amount of data, it is a difficult problem to assimulate these data, convert them to information and make them available for member nations of UNEP or industries to use.

You have heard many times from——

Mr. **Scheuer**. Yes; we heard from a witness who said it is really interesting how this progression has taken place. Back in the days of the Bible, we were seeking after wisdom, and by the Middle Ages, we had sort of narrowed our focus to knowledge. Then in the last half a century, we are talking about information, and now we are talking about data.

Is this telling us something about what modern science and technology is doing to us?

Mr. **Hecht**. I was going to mention Professor Suomi often remarks that trying to assimulate these satellite data is like drinking from a fire hydrant, because there is so much of it.

When one learns the wealth of information that is available, it is disappointing to realize that it is often not in the right form or collated to the extent that it could be rapidly used.

To me, at least, one of the needs of the legislation, one of the problems it addresses, nationally as well as internationally, is to make better use of the existing data and to put the data in the forms that most help states, or nations, or companies to simply take advantage of this wealth of information and materials that have been collected for many, many years. And some of these problems are going to be resolved by developing the right strategies for putting the information together, taking advantage of the existing technologies, and the advances in electronics, and data assembly, and so forth.

Mr. **Scheuer**. And satellite services for the distribution. Whether it is wisdom, information, data, we have got the technique of getting it out there in both the developing world and in the developed world.

Mr. **Hecht**. Also, a meeting like the one next week and many others which address the needs of collecting data, forces the member nations and forces people to think carefully about what data they are collecting, if they are all necessary, and how can one collect data for one purpose while at the same time collecting data for many purposes. From that, there may evolve a certain cooperation, a certain international framework in which many activities are addressed. And the existing structure at the WMO, and particularly in the world climate program, which is struggling with this very question, will be able to answer it positively.

Mr. **Scheuer**. What about the world climate program, the International Institute for Applied Systems Analysis, and UNEP. Are there any others?

Mr. **Hecht**. ICSU.

Mr. **Strommen**. UNDP.

Mr. **Scheuer**. United Nations development program, quite true.

Mr. **Belsky**. International Council of Scientific Unions. SCOPE—Scientific Committee on Protection of the Environment.

Mr. **Scheuer**. United Nations Industrial Development Organization. They probably need to pay more attention to the environmental concerns for some of their industrial projects.

All right, taking those agencies as a group, is the institutional framework established thereby the knowledge can be aggregated and by which information and perhaps some program and policy recommendations can be made to Third World countries?

Mr. **Belsky**. The world climate program was set up to implement and coordinate the institutional mechanism to involve all these other organizations. It is relatively new. We all are very hopeful that it will resolve these problems. They have just selected a new director.

For the data collection, they are working with other organizations in other countries.

The institutional mechanism is there but the question is, Since it is so new, how successful will it be?

Mr. **Scheuer**. How about funding for these agencies? Are these agencies reasonably funded to do at least the minimum job we expect them to do? Anybody?

Mr. **Belsky**. That is a tough question to answer. We went through an exercise last year, when I was the Acting Director, to figure out how much money there should be. We tried to get the Weather Service and other agencies involved. Other countries seem to be having the same kind of financial problems we are.

To be quite candid, I don't think that there is enough money in these programs, but I think that, as the need is demonstrated, there may be. As results indicate that this information can be used to resolve political, economic, and social problems, it will push a lot of countries into doing it together.

Mr. **Scheuer**. I agree, it ought to be a cooperative effort. I am skeptical as to whether the indication of a demonstrated need really produces results. The Canadians tell you that they have demonstrated the need for action in the area of acid rain in the most stark and strident terms, with an overwhelming burden of the evidence; and the Scandinavians will tell you the same thing, but they have not gotten the aggressor countries to look at the plight of the victim countries and make any public policy judgments at all.

Let me ask for the record, for the fiscal year 1983, what the Administration requests for all of these environmental monitoring activities, monitoring and reporting activities?

Mr. **Belsky**. We can get that.

See appendix IV, p. 149.

Mr. **Scheuer**. Let me ask also another question. One of the Administration proposals for this year is to eliminate one of the two polar orbiting weather satellites. We heard testimony on this last week. Would this cutback in the polar orbiting satellites from two to one, affect our relations with other nations, particularly in the developing world? Are there any discussions going on with any other nations, presumably the developed nations, to help us fund these satellites or run some kind of a jointly funded program?

Mr. **Belsky**. I will have to answer that as the NOAA representative here, sir.

Mr. **Scheuer**. I will ask the Department of State.

Mr. **Belsky**. We are seeking alternative methods, not just outside of the United States, but inside the United States.

We are meeting on a regular basis with the Department of Defense. They have polar orbiting satellites, and we are trying to find out, by attaching civilian sensors, but still keeping the security of those sensors on the military satellite safe and secure, if we can resolve some of our needs by a cheaper method or whether the next one can be especially designed to handle both needs.

Externally, there have been a series of meetings, CNEXO, the group from France, to see what their plans are for satellite activities in a 4-year pattern to integrate our effort to have polar satellites, one by us and one by them.

The same with the geostationary. There is a new Director of the Satellite Service, Mr. McElroy, who spent 3 weeks last month overseas knocking on doors to find out what kind of resources are going to be available to share resources in a time of tight budgets. We have to look for those alternatives.

Mr. SCHEUER. Doctor?

Dr. MCCLINTOCK. I will have to defer to Mr. Belsky on that, because we have not been involved at all in the polar satellite question. This does underscore the somewhat difficult circumstances we find ourselves in. We have very few personnel to monitor such international activities and simply to keep abreast of the many things that have to be conducted by the other technical agencies is quite a task.

Mr. SCHEUER. As I understand it, there are about 120 or more countries around the world that use the data from those polar orbiting satellites. Have you had no feedback from these countries, or have you made no inquiries to those countries, as to whether the cutback from two to one will affect the usability of what we give them?

Dr. MCCLINTOCK. We have had no traffic on that.

Mr. CARNEY. To the 120 countries who utilize the information now being provided by the one satellite, do they pay for that service?

Dr. MCCLINTOCK. I would have to find out.

Mr. BELSKY. I can answer that. They pay for a one-time attachment cost to the system and then they don't pay.

Mr. CARNEY. There are two right now?

Mr. BELSKY. Two geostationary and two polars.

I don't think there is a separate charge for each of them, but it is a one-time attachment cost. But a lot of them build their own data resources to enhance the information they get. That is their own cost but only a one-time U.S. tie-in charge to these countries and after that, there is no charge.

There are a lot of reasons for that other than budget. There is a lot of political, economic reasons, et cetera.

Mr. SCHEUER. Security reasons also.

Mr. BELSKY. Yes.

Mr. SCHEUER. We don't want some of these monitoring activities to be so joint that in effect the decisions as to how they are designed and where they go and the kind of information they retrieve would also be subject to joint decision?

Mr. BELSKY. Correct, Mr. Chairman.

Mr. SCHEUER. Anything else?

Mr. CARNEY. One other question of Dr. Baum, and that is, getting back to the bill that we were discussing, getting back to the committee, I notice you have a personal opinion of it. Would your colleagues who have served on that committee, and who are so involved in this area, be willing to give up that aspect of the bill if they thought it would be possible to have the bill go through without it, say on suspension, and not have too much opposition from any quarter? Is their support that strong for the need to maintain the committee?

Mr. **Baum**. I am not sure I understand. The bill as now written will maintain the committee. Are you suggesting a further amendment which would delete it?

Mr. **Carney**. I am suggesting it might be something that I can negotiate and mark up here in subcommittee to try to get the type of support we will need in both committees. I don't think in this committee, but on the full committee and the House, to support this type of bill. Is that something that your community might say you would be willing to put on the table as a gimmick?

Mr. **Baum**. I have to make a speculative answer to that question. My guess is that most of them would not wish to sacrifice the improvement of the national climate program in order to retain the committee. The primary concern would be the welfare of the national climate program.

Mr. **Carney**. That really answers the question.

Mr. Chairman, I have no further questions to ask any of the witnesses.

I might note that note that Dr. Hecht has become very comfortable as a panelist.

Mr. **Scheuer**. You think his new robes fit easily and comfortably?

Mr. **Carney**. He is going to be before this committee a lot, I think.

Mr. **Scheuer**. We have had a very distinguished President, who is known as the great conciliator, and with great measure in noting my ranking minority member is the great conciliator who is going to bring us all to a consensus on the funding for this great program.

If there are no further questions, let me thank all of you for very splendid testimony. We went way over what we thought we were going to run and that is due to the fact that we found all of your remarks very thoughtful and stimulating, and very helpful to us.

The meeting is adjourned.

[Whereupon, at 3:50 p.m., the subcommittee was adjourned.]

APPENDIX IV

QUESTIONS AND ANSWERS FOR THE RECORD

Questions for Dr. Werner Baum

1. The Administration has allocated approximately $100,000 to fund one of the programs mandated by the National Climate Program Act -- namely, the Experimental Climate Forecast Centers.

    a. What strategy should the National Office follow in funding Experimental Climate Forecast Centers?

    b. Is $100,000 enough to accomplish anything? What could be accomplished with $500,000? With $1,000,000?

2. The Administration is recommending elimination of funding for State and regional climate services, which presumably means the Intergovernmental Program established by Section 6 of the National Climate Program Act.

    a. Do you agree with the testimony of Mr. Belsky that these activities could be funded at the State level?

Answers to questions for Dr. Werner A. Baum

1a. The National Climate Program Office should fund several Experimental Climate Forecast Centers. These Centers should be differentiated by forecast methodology applied or by economic sector served. As to methodology, our knowledge is insufficient to warrant placing all our bets on any single approach to forecasting. As to economic sector, different parameters and accuracies are needed for practical purposes for, say, agriculture or energy. Indeed, it is questionable that all Centers should address the generalized, total problem of forecasting. A general long-range forecast is certainly of great scientific interest. Economically, however, a targeted forecast competence would be extremely useful. For energy purposes, for example, it would be very helpful if we could skillfully predict the 10% of coldest winters and the 10% of warmest winters; the differences among the other 80% of winters are of much smaller practical concern. This limited problem might be much easier to solve than the general problem.

1b. $100,000 is totally inadequate. While costs will vary, depending on the nature of an Experimental Climate Forecast Center, I would estimate $250,000 per year to be a typical unit cost figure per Center. Thus $1,000,000 would be a reasonable figure at this time.

2a. No, I do not agree with Mr. Belsky. I envision the Intergovernmental Program as continuing to fund experimental and demonstration projects carried out at the local level. I do not see this Program as providing continuing support (except, perhaps, as the federal government might purchase services it needs); continuing support should come from the economic sectors served as the utility of activities is demonstrated. However, as it is the national economy which will benefit and as climate does not respect state boundaries, it is a responsibility of the federal government to stimulate and seed efforts at the local level which will result in improved productivity. The activities are carried out at the local level because that is where they can be done most effectively, not because they are of local benefit. It is most unlikely that many states would accord high priority to funding such activities of national concern.

MR. MARTIN BELSKY
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

1. The National Climate Program Act created two innovative programs -- the International Climate Program and the Experimental Climate Forecast Centers. Funding for these two programs has never exceeded $100,000 annually.

   a) Why has the Administration never requested significant levels of funding for these activities?

The Intergovernmental Climate Program is being developed in Phases. The first Phase is a series of projects (Federal/State cooperative studies) to demonstrate the value and methods of the intergovernmental process. Projects have been selected that explore new ways of providing climatic services and initiate activities which are likely to be applicable to many states and many climatic situations. The results of such innovative studies must be thoroughly tested before being widely used. Consequently the funding level, currently $200,000 per year, is appropriate for this exploratory stage of program development.

The Experimental Climate Forecast Center program suports one center at the Scripps Institution of Oceanography. NCPO funding in the Center's first year of operation was $179,500. Funding in the second year will be $199,518. Funds provided directly from the NCPO, though currently at minimal levels, do however build upon and consolidate closely related research which NSF and NOAA also support at Scripps.

Both the ECFC and Federal/State cooperative studies programs are exploring new approaches. It is our hope that more substantial funding levels will be achieved after the initial phases are completed.

b) Your testimony indicates that you oppose funding for "State and regional climate services and functions." Does this mean that you oppose funding the Intergovernmental Program?

No. A program of (Federal/State cooperative) demonstration studies is being implemented. Our goal is to develop a program that best serves the needs of the federal government for climate information while indicating how States can also make best use of the information. The Administration opposes, however, funding activities that are the responsibility of the States. This includes providing local climate services. Thus, our approach is to initiate and carry out a limited number of jointly-funded demonstration projects which identify the most effective mechanisms for intergovernmental climate related studies and services. The published results will be available for use in State, regional and local climate services.

c) On pages 2-3 of your testimony, you note some of the accomplishments of the Intergovernmental Program. If this program has been so successful, why are you proposing to terminate it?

We are not proposing to terminate the Federal-State cooperative climate studies. They are an important part of the NCP Act and are being implemented. The initial accomplishments demonstrate useful and beneficial results from the applications of climate data. We will continue to initiate and support a limited number of these jointly-funded cooperative projects.

2. Your testimony (page 5) indicates that the Administration opposes "gap funding" -- that is, authorization for NOAA to fund climate-related activities that meet the goals of the Program if not adequately funded by other Federal agencies.

a. Why do you oppose this provision?

There are already authority and methods to identify and fill programmatic gaps in the Program. Almost all activities of the National Climate Program fall within the mission of a Federal agency. Where that is not true, the Climate Program Policy Board can assign responsibilities to the agencies. The Policy Board is a medium through which agencies can mutually agree on priorities, plan needed programs, and agree on agency roles. Each agency then requests funds to carry out its missions, including climate-related activities. The NCPO, through its contacts with OMB and OSTP, can further support agency climate budget requests.

b) Hasn't the Administration supported the concept of "gap funding" under the National Ocean Pollution Planning Act?

The climate-related missions and roles of the federal agencies have generally existed for many years, are generally well understood and mutually accepted. Ocean pollution problems are of more recent origin and many of the regulatory and jurisdictional questions which they pose are still to be answered. Hence, the concept of "gap funding" might be more appropriately applied to ocean pollution planning activities than to climate activities.

3. Witnesses that we have heard on the Climate Program who live outside Washington feel that the National Climate Program has made little difference to them.

   a) What can be done to improve the visibility and the credibility of the National Climate Program Office?

Steps are already underway to improve the visibility and credibility of the National Climate Program Office. National media representatives attended the recent meeting on climate prediction which was held at the Scripps Institution of Oceanography, site of the first Experimental Climate Forecast Center. Dr. Hecht, the Director-Designate, was interviewed on National Public Radio. The American Meteorological Society will publish a regular feature containing news of the National Climate Program. A recent Science article on the rise of global mean sea level by Robert Etkins (of the NCPO) and Edward Epstein (lately of the NCPO) received widespread national media coverage. In our judgment, as the work of the NCP becomes more widely known, credibility will increase.

   b) What can be done to improve the use and usefulness of climatic information to planners and policy makers?

Many efforts are underway to improve the use and usefulness of climatic information to planners and policy makers. These efforts fall into three categories: gathering the data and information into usable formats; informing people of the existence of the information; and showing how such information can be used. At both the Federal and State levels, work is underway to process existing data into useful formats. For example, NOAA's National Climatic Center received a one-time appropriation in FY82 to process key climatic data sets, and NASA and NOAA are working together to produce compatible data systems. A recently initiated study of surface based measurements brought together producers and users of climate information to consider the observations that will be needed in the decades ahead and NOAA has recently published a national inventory of climate data holdings, showing the characteristics of the data sets and how to obtain the data. The inventory has been well received and is being adopted as the basis for a world climate data inventory. Demonstrating the use of climate information is a prime objective of the Federal-State cooperative studies program. The results of the Federal-State cooperative studies have been reported in informational letters from the NCPO. The results of these and other NCPO supported studies will be presented in the Annual Report and will be summarized in the Bulletin of the American Meteorological Society.

4. You say that past problems with the Climate Program have been ones of leadership, management, and coordination.

   a) What impact do you think that H.R. 5401 will have on management and coordination of the National Climate Program?

The amendments provide a better institutional framework for Program management and coordination. Specifically, this refers to the amendments that formally establish the Climate Program Policy Board and state the functions and responsibilities of both the Policy Board and the Program Office. In a more general way, the amendments promote interagency cooperation needed to accelerate progress in the Program.

DR. DAVID McCLINTOCK, DEPARTMENT OF STATE

Responses to Questions Submitted by House Subcommittee on
Natural Resources, Agriculture Research and Environment
in Hearings of March 16, 1982

Q. 1 You seem to endorse H.R. 5401.

Q. 1.a. In the view of the Department of State, has the National Climate Program Office been effective in coordinating climatic research and services?

A. The Bureau of Oceans and International Environment and Scientific Affairs of the Department of State has enjoyed satisfactory "working level" relations with the National Climate Program Office almost since its inception. Upon occasion, for example, in the process of designing a cooperative climate impact study between the U.S. and Mexico for application to the arid border region, these relations have been characterized by close, collegial contacts and official interest and support on the part of NCPO. On the other hand, relations have been more tenuous in areas of program funding where the Department of State is not involved due to its non-programmatic role. From this somewhat distant vantage point, the Department's impression is that the NCPO has faced certain organizational problems typical of any new program situation and has been dealing with these with increasing efficiency. The Department assumes that NCPO's effectiveness will increase markedly with the present organization effort and with additional legislative support such as proposed in H.R. 5401.

Q. 1.b. Do you believe that H.R. 5401 will help the National Climate Program?

A. As indicated in the testimony by the Department's witness, Dr. David McClintock, H.R. 5401 appears to strengthen and otherwise improve several administrative aspects of the overall program effort. The creation of a Climate Program Policy Board responsible for long range planning and budgetary recommendations, on which the Department of State will be represented, is an especially positive feature.

Q. 1.c. Do you have any specific suggestions for changing any of the provisions of H.R. 5401?

A. As indicated in Dr. McClintock's testimony, we believe the words "in consultation with the Department of State" should be inserted in paragraph (2) (E) of Section 3 of the amendments, between the words "coordinating" and "interagency." This change, although minor, would recognize the Department's formal responsibilities in monitoring the negotiation and conclusion of international agreements on climate matters and would allow the accurate recordation of progress under the many bilateral science and technology agreements in which the United States is involved. While the Department obviously cannot be a central party to negotiating the numerous "working level" S&T agreements that are concluded with other nations with varying degrees of formality, it is essential to receive notice from the principally involved Federal agencies under established Department of State Circular 175 procedures. The fact that it is difficult at present to provide a comprehensive answer to Question 2.c., below, underscores the extent to which the Department of State must participate in all such international negotiations, at least on a consultative basis.

Q. 2. You mentioned the role of the Department of State in monitoring desertification, deforestation, and the "greenhouse effect".

Q. 2.a. Please describe your Bureau's activities in these areas.

A. With regard to desertification, the OES Bureau serves as the principal U.S. Government contact with the United Nations Environment Programme, headquartered in Nairobi, Kenya; UNEP has a key role in international desertification monitoring efforts, having developed the so-called "Plan of Action to Combat Desertification". This in turn is one of several efforts within a broader category of climate impact assessment activities in which UNEP has taken the lead under the aegis of the World Climate Program.

Practically speaking, U.S. desertification monitoring efforts at the international level are conducted primarily in cooperation with Mexico in view of our contiguous territory and the similar climatic conditions prevailing in the arid border region.

The U.S.-Mexico Arid Lands Agreement, signed in 1979, provides a vehicle for practical actions in the area of desertification monitoring. One of the most significant forward steps was the decision in 1981 to utilize the Jornada Experimental Range near Las Cruces, New Mexico, as a site for cooperative scientific monitoring efforts. The Departments of State and Interior, NASA, and the University of Arizona have been active in promoting this activity. Progress at Jornada was reviewed at a meeting of the U.S. Man and the Biosphere Program's Committee meeting on grazing lands, held at El Paso on December 18-19, 1981. It is envisioned that U.S.-Mexico cooperation in this area will serve as a model for similar cooperative efforts in other parts of the Western Hemisphere and elsewhere in the world.

The U.S. and Mexico are both members of the Consultative Group for Desertification Control (DESCON). Established by UNEP following the 1977 U.N. Conference on Desertification to help mobilize additional resources required to implement the Plan of Action to Control Desertification, DESCON includes planning the major component on monitoring. The third meeting of DESCON was held August 26-28, 1981 in Geneva. During this meeting, the U.S. was able to identify certain AID projects which supported or complemented projects sought by DESCON. Thus the U.S. was already making practical contributions to the global effort even as the international community was attempting to focus on the problems. The U.S. is now attempting to focus DESCON activities on policy and program review and away from ad hoc program funding. An updated list of worldwide AID desertification projects is attached, indicating target countries, project titles, and funding levels for the life of the projects or fiscal year, as appropriate. Also attached is a representative listing of similar projects having Peace Corps involvement.

The State Department also continues to be involved in providing guidance and coordinating U.S. participation in a broad analysis of desertification monitoring being jointly carried out by UNEP and the Food and Agriculture Organization of the United Nations (FAO) as part of UNEP's "Global Environmental Monitoring Program".

With regard to deforestation, the Department of State has been spearheading a major U.S. international initiative in this area over the last five years. This was launched in June 1978 with a policy-oriented "U.S. Strategy Conference on Tropical Deforestation" in the State Department, attended by some 150 U.S. and foreign resource management scientists. The conference proceedings and a resultant report to the President entitled "The World's Tropical Forests: A Policy, Strategy and Program for the United States" are attached.

Page 53 of this latter publication lists the original membership of the Interagency Task Force on Tropical Forests, a principal organizational response to the conference which continues to define and coordinate U.S. policy in this area under the co-chairmanship of the State Department and the U.S. Forest Service.

State Department efforts on international tropical deforestation issues have two principal dimensions. At the domestic level, we are working with an array of other U.S. agencies to determine how U.S. funding and expertise can be applied more effectively. We are also maintaining continuing contact with U.S. industry, non-governmental environmental organizations and the university community to ensure active private sector participation in U.S. policy formulation and programs. In response to one finding of the Interagency Task Force on Tropical Forests in its report to the President that better information is needed on the nature and magnitude of direct U.S. contributions to tropical deforestation, the State Department has carried out two studies under contract on (1) the role of the beef cattle industry in the tropical areas of Latin America; and (2) the role of U.S. multinational cooperations in forestry operations in the tropics.

At the international level, the State Department is working cooperatively with other USG agencies to ensure that greater attention is paid by the FAO, UNEP, UNESCO and other relevant UN agencies to tropical forest management issues. In particular, the U.S. has been successful in promoting the concept of an international action plan on tropical forests which will define more clearly the roles and responsibilities of various international, regional and national organizations, and provide for a better coordinated and strengthened collective effort.

In view of the potential sensitivity of efforts by U.S. institutions to promote better management of forest resources that are within the territories of other sovereign states, and the need to coalesce a diversity of often-conflicting U.S. (economic, environmental and political) interests into a coherent international policy, the Department of State regards its international representational and negotiating roles to be of considerable importance and intends to continue its close involvement in international forestry issues.

The State Department's activites on carbon dioxide buildup in the atmosphere have included coordinating U.S. positions on the design and implementation of the World Climate Program which, *inter alia*, we expect will lead to accelerated research and monitoring on any "greenhouse" effect. Through the use of our overseas Embassy capabilities, and the State Department's contacts in a variety of international organizations, we collect and provide to U.S. public and private sector institutions relevant information and data being acquired by other nations and these international bodies, and also attempt to influence the design and direction of foreign programs to help serve U.S. needs.

Q. 2.b. How do you coordinate these efforts with the Council on Environmental Quality (CEQ), with the United Nations Environment Program (UNEP) and with other Federal Agencies?

A. The State Department, through the OES Bureau, chairs broadly-represented interagency task groups on tropical forests and arid lands which are the principal specialized coordination mechanisms within the federal establishment for deforestation and desertification. The OES Bureau also chairs the task group's parent body, the Interagency Committee on International Environmental Affairs, which has broad policy and program review and coordination responsibilities, including the coordination of U.S. participation in UNEP where we continue to press for priority attention by that organization to issues involving arid lands, tropical forests and atmospheric carbon dioxide buildup.

In addition, State is a member of the Interagency Global Issues Work Group, chaired by the CEQ, which is responsible for developing overall U.S. policy on international environmental issues in general. Other members of the Work Group include OMB, the National Security Council, the Departments of Agriculture, Energy, Justice, Interior, EPA, AID, and the

Federal Emergency Management Agency. "Working level" contacts between State/OES and CEQ staffs occur at least weekly and sometime even more frequently.

The State Department has been a member of the Policy Advisory Group established for the National Climate Program (NCP), and regularly sends a representative to meetings chaired by the NCP working group, by the Climate Board of the National Research Council of the National Academy of Sciences, and by the Environmental Data and Information Service of NOAA. "Greenhouse" (CO_2) issues are frequently raised in all of these fora, and discussed on a specific ad hoc basis with CO_2 program officials in the Department of Energy. Numerous informal meetings occur between OES officers and their counterparts in the U.S. Forest Service, AID, Interior, and members of the academic community on program and policy issues pertaining to deforestation and desertification. With specific reference to forestry issues, the Bureau has had frequent contacts with university officials active in "UNIFOR" (Universities for International Forestry), a six-university consortium involved in education, research, and consulting services in the management and utilization of forests and other natural resources in overseas countries.

The OES Bureau performs the principal role in organizing U.S. Government participation in UNEP's Governing Council; an OES Deputy Assistant Secretary normally heads the U.S.

delegation to this annual event, which establishes ongoing goals, priorities and funding commitments for the organization as a whole. Throughout the year, on a wide range of substantive issues, the Bureau remains in close contact with the U.S. Permanent Representative to UNEP who is based in Nairobi and reports to the OES Bureau in Washington. Since the U.S. is one of the principal donors to this U.N. agency, and hence enjoys commensurate influence within it, OES is able to articulate U.S. policy interests and closely monitor resultant UNEP actions. Contacts are also maintained with UNEP's regional representatives based in New York (for North America) and in Mexico City (for Latin America and the Caribbean).

Q. 2.c. What discussions have you had with other nations regarding the "greenhouse effect"? Do other nations regard this problem as a serious threat?

A. The principal involvement of the United States in international discussions regarding the atmospheric effects of CO_2 (the "greenhouse effect") is through the World Meteorological Organization (WMO), based in Geneva. The WMO, in conjunction with the United Nations Environment Programme and the International Council of Scientific Unions (ICSU), is specifically examining the problem within the framework of the World Climate Program. The principal action agency within the U.S. Government is the Department of Energy, which has been funding a $12 million

(FY 82) research program; this represents approximately 50% of the total world research effort on this subject. Therefore, the U.S. is playing a leading research role both from the standpoint of funding and through its interaction with virtually the entire world community as represented in the WMO, UNEP and ICSU. Also, the U.S. -- specifically represented by DOE -- maintains close contact with the European Community which pursues its own CO_2 program. The Department of State maintains close working level contacts with the Carbon Dioxide Research Division of DOE's Office of Energy Research.

Direct State Department interaction with other nations on this issue has principally been associated with our participation on delegations to international conferences and meetings of experts conducted under the auspices of (in particular) WMO, UNEP, the Organization for Economic Cooperation and Development, and the Economic Commission for Europe. In addition, Department officials have also discussed the carbon dioxide-greenhouse effect relationships with counterparts from other countries and international bodies during ad hoc visits on science and technology and environmental affairs matters.

With regard to the question of the attitudes of other nations regarding the "greenhouse effect", any expressions of interest and concern have come almost exclusively from other industrialized nations. The developing world has been largely silent on the issue, with some poorer nations agreeing to resolutions which call for accelerated work to find answers, but others assigning it low priority and arguing that it diverts limited funds from more urgent problems. In the developed world, carbon dioxide buildup has not been perceived as a "threat" to the degree that acid rain or even ozone depletion has been (in terms of urgency); nonetheless, the nations of the East and the West appear to agree that the issue needs attention, that intensified research and monitoring is called for, and that this is an area where international cooperation makes good scientific and economic sense.

It is the Department's experience that much of the foreign interest has tended to come from individuals within the scientific community of the developed nations. Therefore, the dialogue and various positions often tend to reflect individual scientist rather than official national assessments. In the Department's view, this is a serious issue area that requires extensive study to determine what specific problems, if any, exist and how these should best be dealt with. Accordingly, the World Climate Program and involved institutions such as the World Meteorological Organization provide the best possible focal points for such efforts.

QUESTIONS FOR J. DAWSON AHALT

Climate Hearing

Mr. SCHEUER: Are the government's climatic data bases accessible to, and in the format needed by, the agricultural community?

Mr. AHALT: The National Oceanic Atmospheric Administration/National Climate Center (NOAA/NCC) makes basic temperature and precipitation data available from its archive files in hard copy or on magnetic tapes, but with up to 6 months delay. These data are from a macro scale aviation network, mostly at airport locations and are non-representative of agricultural areas or from the meso scale network of volunteer observers. NCC does a good job of providing these data to the Nation's users within existing budget and personnel constraints. However, these raw meteorological observations are only the beginning point for for agricultural applications. For agricultural users these data must first be analyzed and converted to a type of information useful to management in decision making. This means converting temperature data to Growing Degree Days (GDD), identifying first and last freeze dates, determining probabilities of occurrence dates and/or indication of a changing pattern with time; and, converting both precipitation data into probabilities, range, median, and mean and, drought indexes into frequency, duration, and intensity, to mention a few examples. It is important to convert the data to useful information for several reasons: Corn breeders develop corn varieties by GDD classification--the farmer must know what varieties are suitable for his area according to expected GDD; insect pesticide applications are not effective if the insect has not emerged--the emergence of an insect is best predicted by monitoring degree day accumulations; and selection of farm machinery is based on number of days suitable for field work—investment in irrigation equipment is based on analysis of frequencies, duration and intensity of drought related to yield reductions and cost/benefit analysis.

These are but a few of the endless examples of why the climatic data must be converted to information to facilitate sound management decisions in the agri-business farming system of the nation. Often the climate data of the macro scale and meso scale must be further supplemented at the local or State level to provide an adequately detailed analysis for agricultural users. These data usually reside in the researchers or special project files and are not readily available to the user community.

Mr. SCHEUER: If not, what could be done to make climatic data more accessible to agricultural interests?

Mr. AHALT: Because users' needs are highly variable in different regions of the country, State or regional climatic programs are a most important arm of NOAA's NCC. Analysts must have intimate knowledge of the data as it relates to user needs. The State programs that have proven most successful are often part of the State departments of agriculture and or land grant universities. Climatic summaries completed by these programs meet priority needs of the local user and also become important inputs to the Federal sector users as well as being a contact for getting accurate information about weather related problems in more detail than is possible from the macro scale data networks. The National Climate Program should encourage establishment of full time state climatological programs and regional programs as part of the intergovernmental work.

In USDA, a concerted effort is being made to compile and process the long-term international climatic data bases at the Joint Agricultural Weather Facility in a format easily accessible to the Department's global crop estimation needs. Existing basic climatic data sets must be processed into a format meaningful to a wide range of agricultural activities, and be accessible for analysis according to crop seasons in the Northern and Southern Hemisphere. Basic climatic data also needs to be transformed into information useful for agricultural purposes; examples are pre-season moisture, cumulative precipitation over a crop season, temperature extremes, and growing degree days which provide a summation of heat indices, using temperature data, over a growing season for specific crops which serve as guidance for specific growth stages. This requires coordinated effort between agricultural meteorologists trained as agricultural weather analysts and meteorologists trained for weather data processing and analysis and forecasting.

Mr. SCHEUER: In your view. are climatic data sets too widely dispersed? How could we effect better coordination of existing climatic data sets?

Mr. AHALT: The climatic data sets may be to widely dispersed. The lack of coordination is too often related to the lack of a focal point—someone who is adequately knowledgeable about the source of the data, proper analysis techniques, and compatibility of data with user needs. A single data center cannot handle all the necessary climatic data. The weather data is used by a wide diversity of disciplines, and each must cater to its own needs. Thus, climatic data required for agricultural users should be organized within the framework of user organizations such as or the USDA agricultural community since they know best what climatic data base derivatives are necessary for their use. Base data management, processing and analysis can then be performed in a timely efficient and organized manner to provide necessary information for decision making.

Mr. SCHEUER: Where is this facility located?

Mr. AHALT: The Joint Agricultural Weather Facility is located in the South Agriculture Building.

Mr. SCHEUER: How many staff are involved in this project?

Mr. AHALT: JAWF is staffed by 4 professional meteorologists, 3 technicans and 4 professional agricultural meteorologists from NOAA and 3 ADP support personnel from USDA.

Mr. SCHEUER: What type of information does this facility produce?

Mr. AHALT: The Weekly Weather and Crop Bulletin is published by JAWF to provide global climatic and agriculture impact assessment data to a wide range of subscribers--it is the best known product of JAWF. However, the primary purpose is to monitor daily global weather events, prepare assessments of weather impacts on agricultural crop condition and yield potential for all major commodity crops for major growing regions, and alert the Secretary of Agriculture and his top staff daily of significant developments that could influence national policy and management decisions. Commodity analysts from ERS, FAS, SRS and WAOB are regularly briefed to assist them in preparation of world crop estimates. JAWF prepares selected yields estimates, based on crop/weather indices, for use in deliberations of estimates published in the World Crop Production Report. A weekly news release is prepared for distribution on the second working day of the week.

Mr. SCHEUER: In the view of the Department of Agriculture (State), has the National Climate Program Office been effective in coordinating climatic research and services?

Mr. AHALT: The National Climate Program Office has not been as effective in the past as it could be in coordinating climatic research and services for several reasons. We feel the steps currently being proposed will help correct past deficiences.

Mr. SCHEUER: Do you believe that H.R. 5401 will help the National Climate Program? How?

Mr. AHALT: We in USDA believe H.R. 5401 will help the NCP do a better job. The establishment of the Program Policy Board will provide a focus for a coordinated policy guidance, establish priorities on work to be accomplished, and give better overall management potential to the NCP. The elimination of a matching funds requirement will enhance the capability for a short-term pilot or demonstration project. The revision of the 5-year plan on an annual basis simply required too much time from other essential staff support work. The delay in the submission of the annual report will facilitate assembling pertinent budget data. This will help in coordination and review of the integrated agency reports.

Mr. SCHEUER: Do you have any specific suggestions for changing any of the provisions of H.R. 5401?

Mr. AHALT: I have no specific suggestions, sir.

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